PRODUCTS finishing

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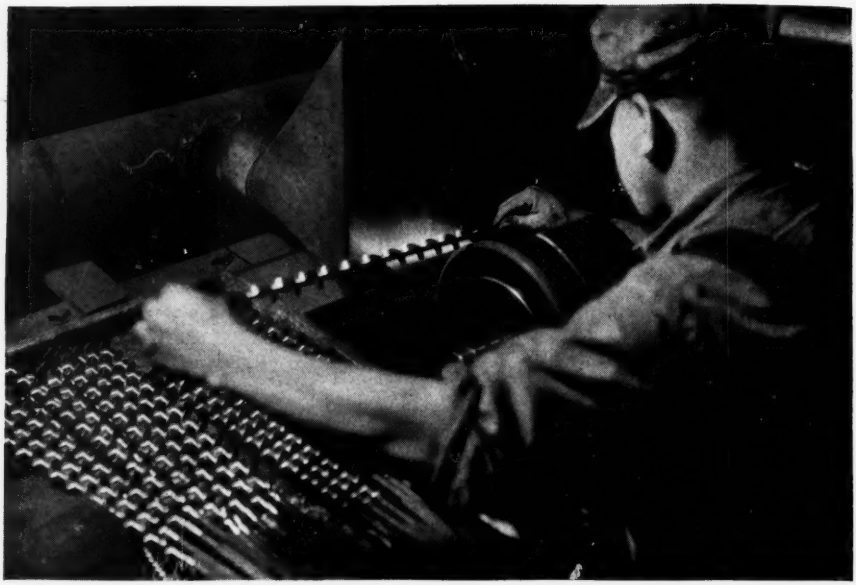

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CINCINNATI, OHIO VOL. 1, No. 3

DECEMBER, 1936

Quick Service Features Kelly Plating Plant

BY DONALD A. CLARK

IT is fast becoming evident that the adoption of plated finishes in industry during the past decade has gradually separated the job plating shops into two groups—the shops that offer a refinishing service on small jobs and operate on small production contracts which provide them with a

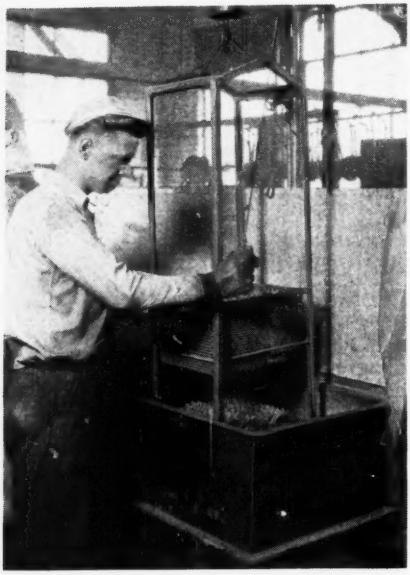
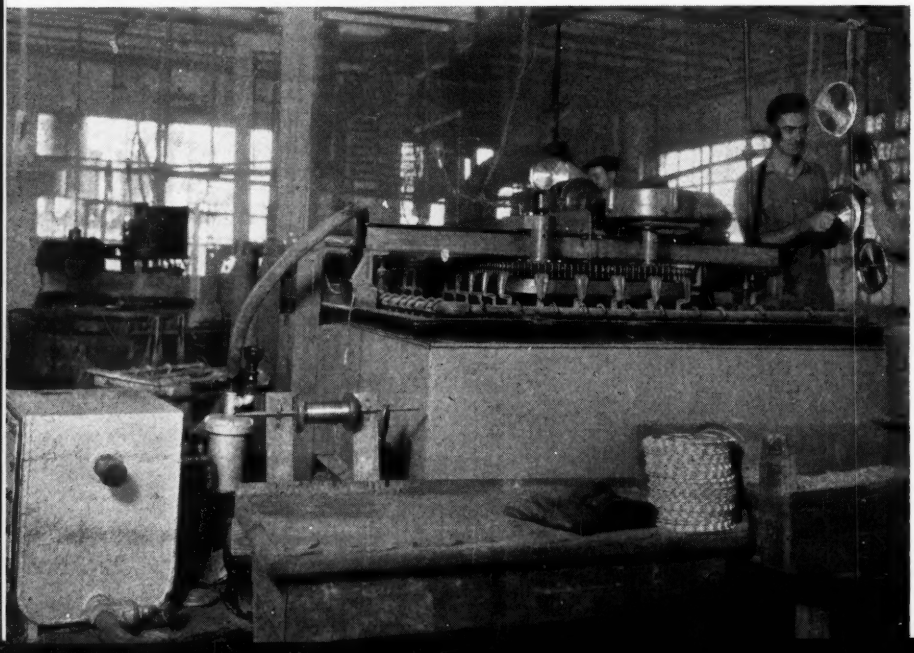


Fig. 1 Above—All work is passed through this degreaser before going to the plating tanks. Fig. 2 Below—Stevens semi-automatic plating unit in operation. The plating time is controlled by controlling the time required for the conveyor to make a circuit of the tank.

satisfactory volume of business, and the shops which are equipped for and entirely devoted to large production contract work for manufacturers. Plants in the latter class are usually concentrated in the industrial areas. The Kelly Plating Company of Cleveland is typical of the plating shops comprising this class.

The type of business for which these shops are operated requires that they be as capable of turning out both quantity and quality as the manufacturer who operates his own plating department. This situation is best illustrated by the case of the automotive manufacturer who turns his overflow work over to such plants during the "peak" of the season when he has more work to do than he can handle in his own plating department. In such a case the job plater must conform to the manufacturer's specifications, and must be able to produce the work at a figure that will be in line with the customer's cost in his own plant.

The ability to handle overflow pro-



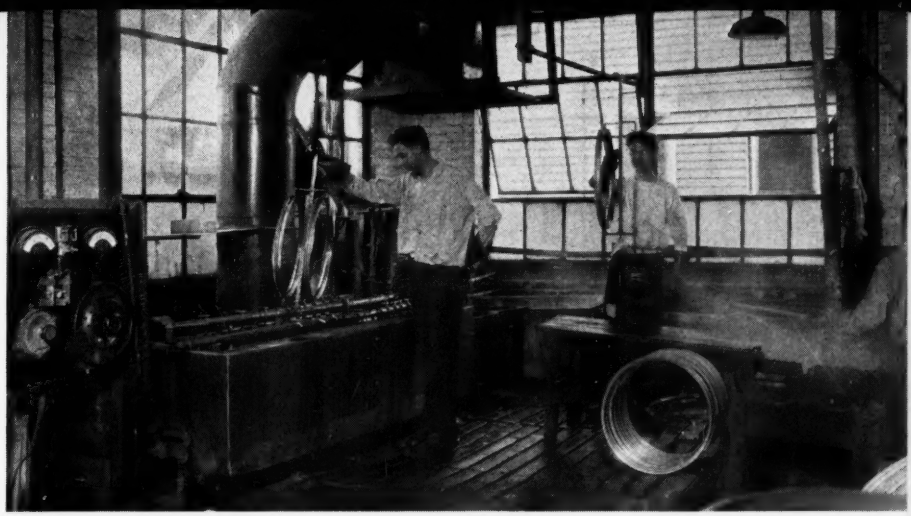


Fig. 3—One of the two chromium plating tanks.

duction work of this kind makes modern polishing, plating and buffing facilities imperative. Good work cannot be produced with antiquated equipment at a cost which will attract business. The rise in the quality of plating finishes has been due largely to the manner in which the plating plant operators have worked with the large users of plating. By keeping step with modern practice and equipment these operators have been able to produce quality plating at a cost which, in many cases, has made it inadvisable for the large manufacturers to install their own plating plants.

Included in the equipment of the Kelly Plating Company is a degreasing outfit, shown in Fig. 1. Before going through the process of plating, all work is passed through this degreaser, which contains degreasing solvent to a depth of four feet. Work is handled in and out of the tank with an electric hoist. The machine has both liquid and vapor compartments, and the work comes from it hot and dry, with all grease removed.

An outstanding piece of equipment is the Stevens semi-automatic plating unit shown in Fig. 2. The unit is 20 feet long by 6 feet wide, and has a capacity of 3,500 gallons of solution. The parts that are plated in this unit are first cleaned on both the degreaser and an electric cleaning tank, following which they pass through several rinses. At the left of the tank is the filter which keeps the solution clean of dirt and metallic particles.

The time required for plating each piece of work that goes into this machine is definitely controlled by controlling the period required for the piece to make a circuit of the tank. The speed of the circuit is variable and can be changed immediately by simply turning a hand wheel on the variable speed motor. The operation of the machine can easily be controlled so that definite thickness specifications can be complied with and a definite rate of production obtained.

Chromium plating on large work is handled in the tank shown in Fig. 3, which is one of two chromium tanks. The area around the tank is well ventilated and all fumes arising from the plating operation are removed by the exhaust fan which can be seen in the illustration. The second chromium tank is shown in Fig. 4.

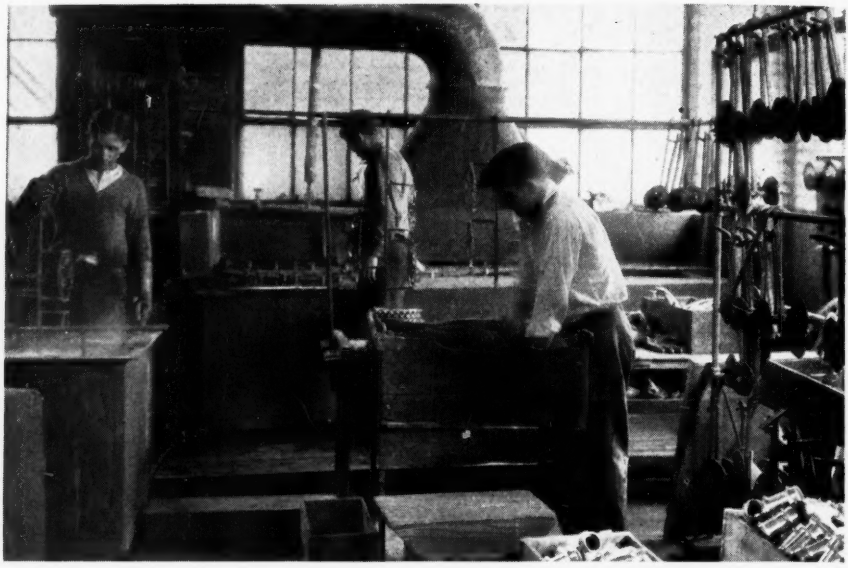
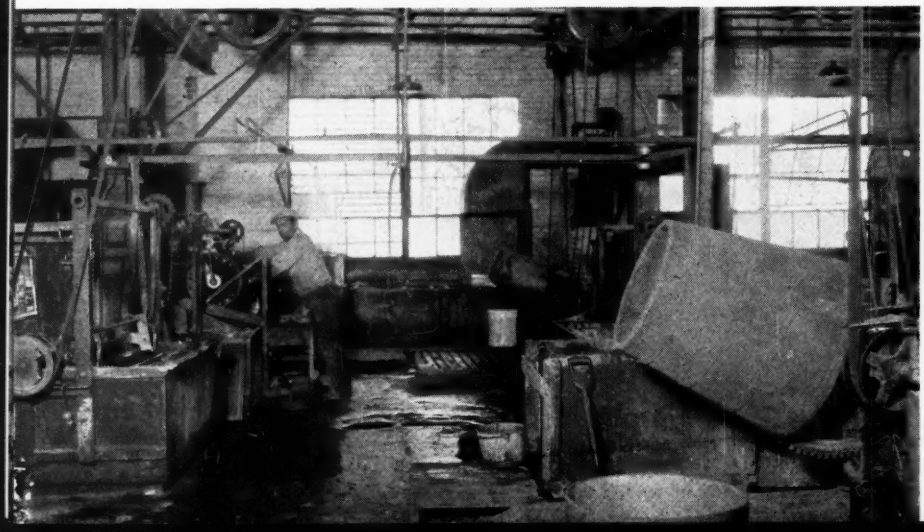


Fig. 4—The smaller parts that are to be chrome plated are handled in this tank.

The demand for bright chromium plate has grown considerably, but there has also been increase in the demand for rust-proof finishes and bright nickel plating. To round out the facilities for handling such work, the barrel plating equipment illustrated in Fig. 5 is used. This department takes care of the plating of zinc, cadmium, and nickel, and also

Fig. 5—Barrel plating department, which handles the zinc, cadmium and barrel nickel plating, also pickling, tumbling, and acid dipping.



handles the pickling, tumbling, and acid dipping.

The plating equipment is supplemented by an adequate layout of polishing and buffing machines, among which are a number of automatic machines which play their part in the reduction of costs. A few of these machines are shown in Fig. 6. Here the equipment is arranged so as to provide the maximum of daylight and ventilation, both of which are highly desirable in the performance of plating and buffing operations.

Not the least of the problems that confront the job or contract plater is the development of efficient plating racks to handle the great variety of jobs that he may be called upon to finish. Each production plating job requires its own special type of rack, although it is possible to use a universal rack which will accommodate a variety of jobs. The illustration Fig. 7 shows one of the racks that has been developed by the Kelly Plating Company, and which has proved so adaptable that this firm has made the rack available to industry at large. The rack shown is used for the rapid handling of screws, bolts, and other small parts which heretofore have been tedious to handle in the chromium plating operation.

Fig. 6—One section of polishing and buffing department.

Practically any shop will, however, find itself particularly efficient on certain types and kinds of work. The Kelly Plating Company is at present engaged in the finishing of kitchen ware, bicycle parts, stove parts, and automobile hardware, all of which is handled in considerable volume. The plant occupies 12,000 square feet of floor space, which provides ample room for handling of bulky work and the operation of its plating equipment.

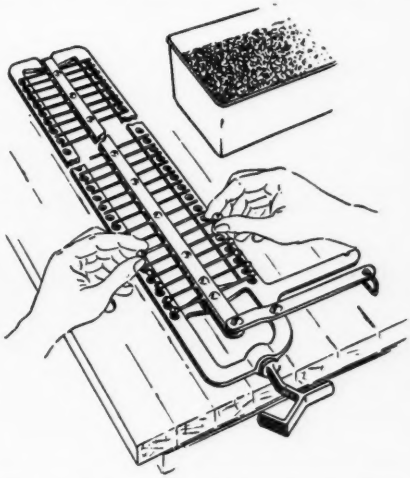


Fig. 7—Patented universal rack for small parts, developed by the Kelly Plating Company.

CAM TIMER BULLETIN CPT. A bulletin now issued by Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa., describes in detail the fundamental features of Cam Timers. This bulletin, together with Form 85, which is designed to assist in the analysis of timing problems, will be sent upon request.

Organic Coatings for Metal Products, I

In this article the author explains organic coatings, otherwise referred to as oil, synthetic, or lacquer type of enamels.

By M. H. Corbin,
Technical Director, The Arco Company, Cleveland, Ohio

TODAY, with streamline design and modernistic finishes, color plays an important part in the sales appeal of many metal products. People have become color-conscious, and paints are the primary medium for imparting the color. No doubt, many executives deciding on the finish of a new product consider the use of organic coatings merely for their color value. In a number of cases paints have been selected from competitive lists only because the color in one list was more appealing than that in another. However, it is very seldom, in fact rare, when any recognized paint and lacquer company cannot duplicate the color of another. The choice of organic coatings should be based primarily on their physical properties and their adaptability to working conditions.

The essential factor to take into consideration from a practical point of view is the cost of finishing. The amount to be allowed for this operation is determined by the product to be finished, quality necessary, conditions which the product is to be exposed, and the type of metal to be finished. The next thing to consider is the method of application and drying conditions. In most cases a system of finishing is already in operation in the plant, and materials have to be formulated to meet those established methods. On the other hand, in a number of instances, it is more economical to change these conditions; but this change should be made only after a thorough study and investigation have proven that present operations are inadequate. The purpose of this series of articles is to bring out the fundamental uses of different types of organic coatings as applied to metal products.

Development in the protective coating industry has been very rapid in the last few years, so that many new types of finishing materials are available from which one may choose.

The cost of finishing material should be considered on a unit cost basis, rather than on the cost per gallon. In a number of cases slightly increased gallon cost has resulted in a larger unit cost savings. It is also advisable to review at definite intervals your finishing operations and materials to insure that you are taking advantage of up-to-date materials and methods of finishing.

Organic coatings as used for metal finishing are generally referred to as oil, synthetic, or lacquer type of enamels. Each system has its advantages and disadvantages.

Oil or varnish enamels are made by incorporating pigments in a suit-

able varnish vehicle, and then reducing this material to a workable consistency by the use of solvents. Although the choice of pigments is important, the vehicle or varnish is fundamentally the governing factor of good paints.

The vehicle is made by combining "gums" or resins with drying oils, with the aid of heat. Different types of gums and oils give varying properties to the resultant product. In most cases combinations of different varnishes are required to give the desired result. The temperature and time of "cooking" the varnish also have considerable influence on the resultant properties of the film. Varnish type films dry by oxidation.

"Synthetic" is a broad term, and its use is grossly abused. In some cases, extremely small amounts of a synthetic gum are incorporated into a varnish and the finished product is called a synthetic enamel. This type of material has very little, if any, of the properties of true "synthetics" and often is misleading to the purchaser.

In general, synthetics refer to alkyd resin vehicles or varnishes of the type whose gum content is high in phenolic type resins. There are many types of synthetic resins, each possessing definite characteristics. Their properties will be discussed in another article of this series.

The term, "Synthetics", as referring to paints, lacquers, and so on, came into general use at the time the glycerol phthalate or alkyd resins were adopted by the industry. However, some synthetic resins, such as phenol resins (Amberols, Bakelite, etc.) were used several years before.

The alkyd type resins dry by polymerization as well as oxidation. They are used as the finished vehicle into which the pigments are incorporated.

The phenolic resins are "cooked" with drying oils in a manner similar to the cooking of ortohodox varnishes. Varnishes made with these resins generally dry more quickly and with a harder film than the usual type of varnish.

The oil type materials can be obtained either for air drying or baking. If finishing costs are to be kept at a minimum and hardness and durability are not important factors, the oil type air dry material will suffice. Products such as agricultural implements, heavy road machinery, etc. are examples of where this type of coating is used. The finish is required to stand up only until the object is used. The objects are finished by cleaning with solvent to remove oil and grease, and covering with one coat of a cheap, air drying paint, applied by either spraying or dipping. It is allowed to dry for twelve to twenty-four hours, and the objects coated are then ready for packing.

Since air drying finishes require this long to dry, they necessitate large areas for storage, particularly where production is large. By baking the finish the drying time is reduced to one-half to two hours, depending on the temperature at which the object is baked. In this case, however, ovens are required. Steam or indirect gas ovens are the type most generally used. In some cases, the conveyor type oven, synchronized with the production line, keeps the product moving through the plant at a definite rate. Finishes for toys, waste baskets, switch boxes, drum enamels, and so on are examples of baking oil type finishes.

The color and gloss of this type of finish can be varied to suit the user. However, in whites and pastel shades, the color is susceptible to change. The basis of such finishes is generally a short rosin or ester bum varnish in which suitable pigments are dispersed. These materials tend to become brittle with age and have a tendency to chip

and flake off; thus they offer very little protection to the base metal.

Air dry synthetic enamels are used on one-coat systems, but the maximum benefits from synthetics are obtained by baking. Although air dry synthetics are not as durable or as hard as baked finishes, they are considerably better than the usual air dry paint enamel.

The next best system consists of one coat of synthetic enamel, baked at a temperature of 200 deg. F. to 300 deg. F. for one-half to two hours. This system will give a more elastic finish and will stand considerably more abuse than conventional oil type enamels. These finishes are used on better grade toys, lockers, automobile parts, heaters, bicycles, and so on, and consist of phenolic varnishes or glycerol phthalate vehicles.

When oven equipment is not feasible, and speed of operation is necessary, a one-coat lacquer system is recommended. Air dry lacquers give even harder surfaces than baked finishes and, in many cases, are as permanent. Their unit cost is somewhat higher than that of synthetics because their coverage (square feet per gallon) is less. However, their resultant finish is easily repaired when scratched in assembly or handling. This is a factor which helps reduce the number of rejects.

The next best finish is a two-coat system which makes use of a primer. The primer is generally either an oil type or synthetic. In the use of either type the metal has to be cleaned thoroughly. However, in the instances where synthetics are used, we find that they require more careful cleaning in order to obtain the maximum adhesion. Primers are baked at temperatures from 250 deg. F. to 375 deg. F. for one-half to two hours.

This type of finishing system is used for such objects as trailers, steel kitchen furniture, filing cabinets, metal partitions, metal furniture and similar products.

The primer is applied by either dipping or spraying, while the finishing coat is always applied by spraying. In case the base metal does not have a uniform smooth finish, it is advisable to use a primer-surfacer which will fill up small imperfections in the metal. When a primer-surfacer is used, sanding to a smooth surface is necessary before the finish coat is applied.

This type of finish is used on metal trailers, for example. In this case, after first cleaning the metal thoroughly, one coat of a primer-surfacer is applied by spraying and is baked at 250 deg. F. for one hour. After sanding, one coat of synthetic enamel is applied—also by spraying—and this is baked for one hour at 250 deg. F. Such a residual lustre and smoothness of finish is obtained that no further treatment is necessary. This type of system give unusually good weathering durability, and retains its lustre for long periods of time.

Another example of a baked two-coat system is the finishing routine used for steel kitchen equipment. In this case one coat of a white synthetic primer is sprayed onto the object and baked one hour at 325 deg. F. This is followed by a white high gloss synthetic enamel which is baked one hour at 290 deg. F. A conveyor-type indirect gas oven is used so that production is kept at a definite rate. This results in a high gloss white porcelain-like finish. It is hard, tough, and elastic, and will not chip or flake.

Metal furniture is usually covered by oil type finishes. The primers in most cases are applied by dipping, and they are then baked for forty-five minutes to two hours at temperatures ranging from 160 deg. F. to 300 deg. F. Portions of the furniture are then given a finish coat of olive green

enamel which is sprayed and baked within the same time and temperature range. This finish coat is generally formulated to possess mar-proofing properties. In some cases a top coat of lacquer is applied in order to obtain the maximum hardness.

Where rough castings are to be covered it is necessary to use a three-coat system to obtain a finish with a good appearance. In this case, after a suitable primer is applied, a surfacer which is formulated so as to obtain maximum filling properties is applied. In some cases more than one coat is necessary, depending on the depth of sand holes and irregularities in the castings. It is then sanded to a uniform, smooth surface, after which the finish coat is applied. The surfacer can be made to either bake or air dry.

Novelty and special finishes come into vogue at intervals. Not only are they attractive but most of them, being rough and irregular, also cover up the imperfections of the metal surface at the minimum cost.

For example, many unusual effects are produced with a wrinkle finish. One coat applied to metal is generally sufficient. With proper manipulation of the spray gun and suitable color or bronzing paints, polychrome finishes can readily be produced. Wrinkle finishes require baking for one-half to two hours at temperatures of 200 deg. F. to 300 deg. F.

A crystal finish is another type that covers imperfections of the metal with a one coat application. A "foul" gas oven is necessary to produce this effect. There, the material is baked at temperatures of 200 deg. F. to 300 deg. F. for one to two hours.

Crystallizing lacquers are also applied for one-coat jobs and produce many varied artistic effects. Although they do not require baking operations, they are not as permanent as either of the above special finishes. Care must be exercised in the application of crystal lacquers, particularly in avoiding an excess of air currents. The crystallizing effect is produced by organic salts actually crystallizing out of lacquer solvents. The slower the crystallization, the larger and longer the crystals. Various designs are thus produced by the use of different organic salts. Unusual effects are obtained by applying colors ground in oil and wiping the high lights free from color—sort of a relief effect. A top coat lacquer can also be applied, removing the crystal formation but leaving the relief of the crystal formation. The crystal formation can, however, be retained by the use of a special top coat material.

Crackle lacquer also produces some interesting effects. In this case a ground coat is applied. The material is of the usual lacquer enamel type. After this is dried, a crackle lacquer is applied, which is a material that carries an excess of pigment; thus when it dries the contraction causes fissures in the surface. The color of the ground coat can be seen through the fissures thus produced. A protection coat of clear lacquer is then applied. The size of fissures can be controlled by the formulation of the material and by the amount of crackle lacquer applied. Both the crackle lacquer and the ground coat can be made in almost any color and in this way various color effects can be produced. An imitation leather finish also can be readily obtained.

Moreover, organic coatings can be made to resemble cloth in appearance. This type of finish is produced by first applying a coat of clear slow drying lacquer or four hour enamel, and, before the film is dry, flock is sprayed on the tacky surface by means of a special spray gun. The resultant finish, resembles suede.

In appearance, metal can be made to duplicate the finest woods. The

general system, although various modifications are used, is first to apply a ground coat of the proper color, the material being either a lacquer or a baked enamel (oil or synthetic). The wood graining is then applied, the desired wood grain being photographed and reproduced on a metal plate. By the usual etching process the grain portion is etched out of the plate and used as the ink well. A composition roller takes up this ink and transfers it to the metal on top of the ground coat. After the ink is dried, a finishing clear or flat lacquer coat is applied. Hand graining is also still practiced in a number of cases, but the transfer method is usually used.

By using metal bronzes, the base metal can take on the appearance of other metals. This type of finish is used to a considerable extent. Colored pigments can also be incorporated with the metal bronze, and polychromatic finishes can be obtained.

In general, oil type materials are cheaper from the standpoint of unit cost as well as gallon cost. Synthetics are recommended where adhesion and durability are factors of importance. Lacquers, on the other hand, are used where the space allotted for finishing is limited, maximum hardness of surface is required, and speed in the finishing operation is necessary.

R & H TECHNICAL SERVICE MANUAL ON ELECTROTINNING. A 12-page manual describing electrotinning with the DuPont Sodium Stannate-Acetate Bath has been issued by the E. I. Dupont De Nemours & Co., Inc., R. & H. Chemicals Dept., Wilmington, Del. The manual is divided into five sections. The first of these sections describes the industrial features of DuPont Sodium Stannate-Acetate Electrotinning with specific applications. The second part describes plating solutions with reference to the equipment required, composition of the solution, preparation of the solution, and the functions of the bath ingredients. The third part discusses control and maintenance giving a summary of plating conditions, anode current densities, bath voltages, cathode current densities, caustic soda content, the temperature of solution, and the time of plating. The fourth part of this booklet describes the preparation of the base metal. The method of removing oil and grease is discussed in detail. Solvent degreasing, alkaline cleaners, acid pickling, and cyanide cleaning are also discussed in this section.

Part Five deals with the analytical method of bath control. The sodium stannate content, both volumetric and gravimetric, of the electrotinning solution is described in detail in this section. Those engaged in coating metal with tin will be sent copies free upon request.

AMERICAN NICKELOID KEY FOLDER. The American Nickeloid Co., Peru, Ill., has just issued a 4-page folder entitled "The Key to More Sales and Bigger Profits" which presents in brief the reasons why more than 2000 manufacturers are using American Bonded Metals. A sample of the pre-finished American Bonded Metal in the form of a key is fastened to the front cover. Copy free upon request.

ATC BULLETIN G-9. The Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa., has issued a four page bulletin G-9 entitled "Regulating Temperature, Time, Level, Flow, Pressure." It explains the desirability of a standard line of automatic controls in which a standardization of parts has been developed. On page two of the bulletin the Automatic Temperature Control equipment is identified briefly. A list of ATC Timer applications is found on the same page. The last part of the bulletin is headed "Information Required for the Selection of Temperature Controls." Copy free upon request.

H-V W-M KOTE-RAX BULLETIN KR-101. A synthetic rubber-like material developed for the protection of plating racks to be known as "Kote-Rax" is described in a 4-page bulletin which has been issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The method of application on both new and old racks is described in detail. The bulletin is well illustrated, showing installations where Kote-Rax has been used to good advantage. The advantages of this material, as to the drying time, are fully explained. Copies free to executives of plating plants.

New Metal Cleaning Process

By C. Johnson
Technical Director, Oakite Products, Inc.

THE preparation of metal surfaces for finishing involves the removal of a variety of types of foreign matter which may be broadly divided into three classes: (1) Lubricants and rust preventing compounds, (2) Oxide films, and (3) Dirt films. Effective methods for removing the first two types have been in existence for years, but research has resulted in improved products and processes for increasing the effectiveness of these older processes, as, for example, the substitution of non-inflammable pure solvent vapors for the inflammable hydrocarbon solvents in degreasing and the application of electric current, both alternating and direct, to accelerate the removal of oxide films.

Until recently there was no cleaning process designed specifically for the removal of films consisting of small particles of loosely adherent solid matter which are almost invariably present on metal surfaces when they arrive in the finishing department and which, for convenience, we shall call dirt. These particles originate from a great variety of sources. They may consist of (1) Pickling smut present on oily steel stock when received at the plant. (2) Dust picked up by the oily surface of the stock during shipment, storage and manufacturing. (3) Pigments from drawing and stamping lubricants. (4) Finely divided metallic particles and dirt mixed with lubricating oil from machines smeared onto the stock by workmen's hands. (5) Abrasives employed in polishing and buffing operations. One or more of these different types of dirt may be present on the stock when it arrives at the finishing department.

The methods which are effective for removing oils and greases have no effect on solid matter of these types because the particles are insoluble in alkaline cleaning solutions or cleaning solvents. Either of these types of cleaning agents will degrease the dirt particles at the same time that they remove the oil and grease from the metal surface and the large par-

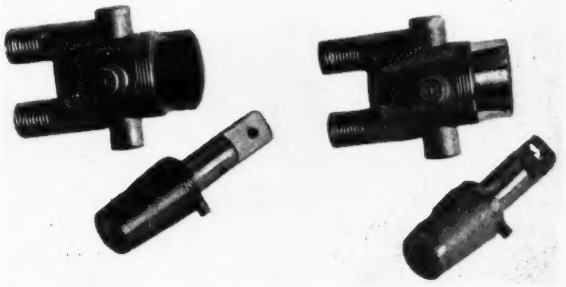


Fig. 1—Gas cocks before and after removal of grinding compound by new process.

ticles of dirt which are held in place by oil and grease will be flushed off. The very fine particles which show up usually as finger prints or

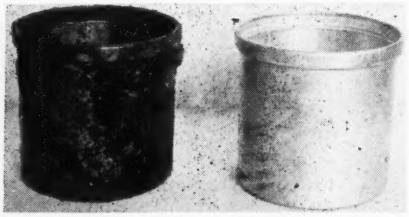


Fig. 2—Aluminum test containers. Before and after removal of heavy petroleum tar deposits, using new process for pre-cleaning.

streaks where the film has been removed in handling resist the action of all cleaning operations which are specifically designed for oil or grease removal.

Acid solutions will not dissolve the dirt particles, and, as a matter of fact, especially in the case of steel, will attack the surface of the metal and liberate additional particles of carbon and carbides in the form of a pickling smut.

When the finishing operation is one of painting or japanning in dark colors, the covering power of the finish will hide this form of dirt. Light colors, however, will be duller when applied over such dirt and if the finish is applied by dipping, the finishing material in the dipping tank will pick up enough dirt from the work to throw it off color. If the film is not uniformly distributed, as is usually the case, it will show through an electrodeposit. Finger prints and streaks in the dirt film become more prominent after plating because of the tendency for the electrodeposited metal to accentuate any defects of the surface over which it is applied.

Because the dirt particles causing trouble are extremely small, ranging downward almost if not actually to colloidal dimensions, the problem of separating them from the metal surface without resorting to the only previously available process of brushing, or wiping all parts of larger surface areas, or tumbling small objects with sawdust, leather scrap or other similar absorbent materials seemed to be an insurmountable problem.

Prolonged research devoted to the problem resulted in an entirely new process employing a combination of several principles in cleaning. This process takes advantage of changes in molecular forces which occur at the instant that a substance dissolves in water.

Broadly speaking, an emulsion is a dispersion of one substance in another in which it is insoluble. Foam, for example, is an emulsion of air in water, while fog is an emulsion of water in air. The more limited definiton of an emulsion is, however, the dispersion of small particles of one liquid in another liquid in which it is insoluble or only soluble to a limited extent.

An emulsifying agent is a substance that will aid in producing a stable emulsion and is therefore a substance with film forming properties which

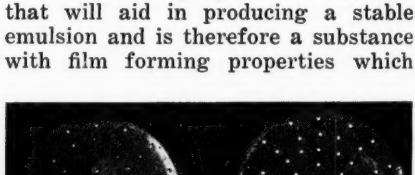


Fig. 3—Buffed brass shower heads cleaned by new process. (Left) Before cleaning. (Right) After cleaning.

will coat the small particles of liquid and prevent them from uniting to form larger particles which will

eventually lead to complete separation of the two liquids into two layers if their specific gravities are different.

Many emulsifying agents have the property of reducing the surface tension of water. If, for example, a drop of an emulsifiable cutting oil is carefully placed on the surface of a dish of clean water a very astonishing action takes place. The emulsifying agent in the oil drop starts to dissolve in the water and reduces the surface tension of the water film around the oil drop. This local weakening of the surface film sets up an intense activity which continues until the drop of oil has been spread over the entire surface of the water. The addition of a second drop of oil causes considerably less activity because the contaminated water surface has a lower surface tension, and after three or four drops have been added the surface tension of the water has been reduced to such an extent that no appreciable activity takes place. The surface tension is due to intermolecular attraction. When the surface tension is reduced the surface energy is reduced and by properly arranging the conditions, the surface energy liberated becomes available for cleaning.

In applying this principal to the removal of dirt films from metal surfaces, the oily dirt particles must be coated with a substance which is soluble in water and which will reduce the surface tension and the interfacial tension of water to oil and dirt. This is accomplished by applying a solution of a water soluble emulsifying agent in a hydrocarbon solvent. The hydrocarbon solvent dilutes the oil present on the surface and spreads the emulsifying agent over the surfaces of the particles, and this makes it possible for water to wet them. The application of the special solvent is therefore the preparation of the dirt film for the cleaning operation, which consists merely of washing the prepared film with water by dipping or spraying.

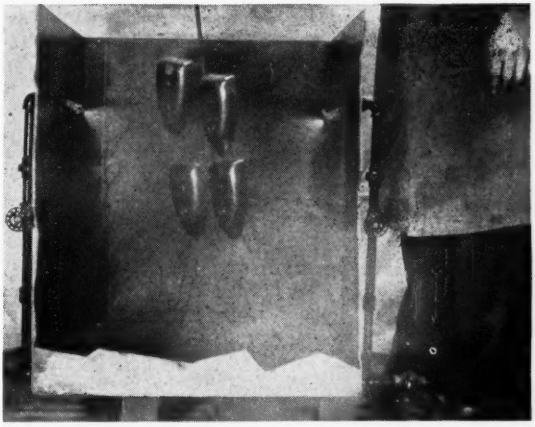


Fig. 4—Section of spray rinsing tank showing side nozzles and foot valve for control of rinse sprays.

As soon as the water strikes the surface, emulsification of the oil and grease present on the surface takes place because these have been converted into an emulsifiable form by the emulsifying agents in the solvent. The surface tension of the rinse water is reduced almost instantaneously as it strikes the oily film. The particles of dirt also become surrounded by a water film. Oil has a far greater spreading and wetting power for metal than water and therefore a layer of oil of sufficient thickness to be water repellant is left on the metal surface. Because the metal surface retains an oil film, the dirt particles which have been surrounded by a water film can be readily washed off. It is apparently the pronounced reduction of the

interfacial tensions between water and dirt by the presence of the emulsifying agent on the surface of the dirt particles which is responsible for the unusual effect.

It is obvious that the solvent containing the emulsifying agent serves a double purpose—first as a carrying agent to bring the emulsifying agents into contact with the dirt particles and second as a diluting agent for the oils and grease film which holds the particles to the metal surface.

An intensive study of emulsifying agents and the proper blending of them with hydrocarbon solvents was required to produce an effective product which will perform satisfactorily on a great variety of shapes and sizes of metal parts under different operating conditions. The tendency for most emulsifiable solvents to be converted into a paste when contaminated with a small amount of water had to be overcome in order to make the process adaptable to the cleaning in small parts in bulk, because if the first contact with water solidified the solvent, the dirt was held in place by the solidified solvent and it became almost impossible to wash the solidified mixture off the parts.

The emulsifiable solvent finally considered acceptable for carrying out the process has the following physical properties:

1. Specific Viscosity—1.1-1.2 (Water=1.0).

2. Flash Point — Open cup — 130 deg. F. or higher.

3. Specific gravity—.840 to .850.

4. Water tolerance—The solvent must absorb 25 per cent by volume of water and still remain a homogeneous material instead of being converted into a concentrated emulsion.

5. Fluidity of emulsion—The emulsion formed when the solvent is gradually diluted with more than 25 per cent by volume of water must remain liquid throughout the entire dilution range.

6. Oil tolerance—The solvent must absorb 25 per cent by volume of heavy lubricating oil without losing its rapid emulsifying characteristics and without increasing its viscosity appreciably.

While the removal of the dirt is completed in the rinsing operation, the extremely good penetrating and diluting action of the solvent causes a considerable amount of dirt to accumulate in the solvent container. It has been found, however, that neither dirt nor oil contamination has any detrimental effect on the efficiency of a properly compounded solvent. The dirt settles to the bottom of the container while the oil is actually taken up by the solvent and thereby increases its volume and becomes a part of it.

When a large volume of work is put through a limited volume of solvent, it becomes necessary at regular intervals to remove the solvent from the working tank and clean out the accumulation of dirt. The used solvent may then be returned to the tank or the tank charged with a fresh supply of solvent. The used solvent is then allowed to stand until all remaining dirt has settled out and many be used for replenishing the supply in the working tank. Filtering will remove the coarser particles of dirt, but the finest particles will pass through any filter available. Centrifugal separation is practical but has never been found necessary because the dirt in suspension in the solvent has never been found to reprecipitate on the work.

While oil and dirt contamination of the solvent are not objectionable, it is important to avoid continuous water contamination because, as soon as the water tolerance of 25 per cent is

exceeded, the solvent ceases to be a homogeneous solvent and becomes a concentrated emulsion. Severe oil contamination reduces the water tolerance and therefore a solvent which has been in use for some time will show less than the normal 25 per cent water tolerance of the original solvent.

The entire cleaning process consists of three essential steps:

1. Applying the hydrocarbon solution of emulsifying agent by dipping or spraying.
2. Washing with water by immersion and agitation or by spraying.
3. Removal of a very thin residual oil film by any suitable method.

The time required for the first step varies according to the type and amount of dirt present. A thin film of dirt, such as is often found on cold rolled steel stock, can be saturated in 5 seconds or less. For large production on light films it has been found most practical to employ a single-tank standard type of metal washer. The conveyor for carrying the work through this unit does not run through the following rinse because this results in drag-out of solvent and drag-in of water by the conveyor inself.

On this type of installation the machine for applying the solvent is separated from the following machine by a space of approximately 10 feet, wherever possible, to provide for drainage and recovery of the solvent by a suitably arranged drip-pan which returns the solvent to the machine. By providing suitable supports on the conveyor, most shapes can be placed so that they will not drag out more solvent than is actually required to saturate the surfaces. For smaller production, immersion in the solvent is entirely satisfactory.

The second step is the one in which the actual removal of the dirt film takes place, and it is therefore important to carry it out properly. Cold water is employed, thus eliminating the cost of heating. On continuous production, a standard type of metal washing machine is employed, so arranged that the parts will be picked up by its conveyor from the conveyor of the preceding unit. A one-minute wash is adequate for removing the adhering solvent and dirt. For smaller installations, a steel tank with bottom drain is used. Spray pipes or nozzles are arranged on all four sides of this tank, properly spaced so that all parts of the surface will be reached.

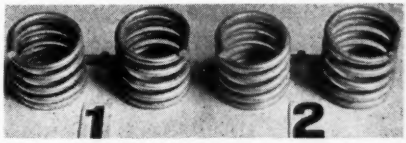


Fig. 5—Steel springs after cadmium plating. (1) Pre-cleaned by tumbling in sawdust. (2) Pre-cleaned by Saturol process. Note improved coverage on interior of spring which sawdust does not clean because it packs into the coil. (Note: These springs were previously tumbled 3 hours instead of 30 minutes).

A foot valve makes it possible for the operator to quickly turn on the sprays only when they are actually required, thus conserving water. The used rinse water is allowed to flow out of the tank continuously in most cases, but for certain types of work, as for example small parts in bulk, the tank may be kept partially filled with water so that the basket of parts can be immersed for the preliminary rinses and then sprayed with fresh water for the final rinse. A final rinse with clear water is always desirable because a standing rinse gradually becomes contaminated with dirt and emulsified solvent. With a properly compounded solvent which does not form a paste or jelly when it comes into contact with water, the water pressure usually available is adequate for rinsing.

The third step in the process can be carried out in a variety of ways. The film of oil remaining on the metal surface is so extremely light and so uniformly distributed that it can be removed even by mild acid baths. For example, sheet metal or wire parts which are to be tinned must be pickled to remove oxide films, and the pickling bath will also remove the thin oil film overlying the oxides without any appreciable oil contamination of the pickling acid. Chemical treating baths which are acid in reaction will also remove the oil film simultaneously with the formation of the coating.

Polished or bright cold rolled steel stock can be cleaned and plated in a hot cyanide plating bath after the first two steps are performed, if the washing has been thoroughly done so that none of the emulsified solvent will be carried into the plating bath. In the case of parts which are to be painted, the third step is not necessary. The surface is actually cleaner at this stage than if it had been cleaned with gasoline, benzene or other solvent that has become contaminated with a small amount of oil. A rinse in boiling hot water is employed at the final step when it is desired to dry the parts for painting.

Numerous case histories are available illustrating the economy of the process and improved results obtained. A few typical ones will illustrate the scope of the process.

Case I. Cleaning wire products before hot tining.

Previous method: A hot alkaline bath, rinse, pickle, rinse, flux, tin.

New method: Immerse in cold solvent, cold spray rinse, pickle, rinse, flux, tin.

Advantages:

1. Elimination of heated tank.
2. Removal of dirt not previously removed by hot alkaline bath.
3. Better coverage with tin. Absence of dirt particles makes it possible to get as good coverage in one tinning operation as was previously obtained by two on most of the work.
4. Saving of tin and labor due to elimination of retinning because of incomplete coverage.
5. Brighter and smoother tin coating because of absence of dirt particles in tin coating.
6. Cleaner pickle and flux baths because no dirt is carried into these baths as is the case when work has been cleaned with a hot alkaline bath.

Case II. Cleaning small metal parts in bulk before barrel plating.

Previous method: Tumble in sawdust 30 minutes, using a separate tumbling barrel for each of a great variety of parts, separate sawdust from parts, clean in alkaline solution, rinse, acid dip, rinse, electroplate.

New method: Immerse in solvent 1 minute, drain 2 minutes, rinse 1 minute, clean in alkaline solution, rinse, acid dip, rinse, electroplate.

Advantages:

1. Saving in time—4 minutes versus 30 minutes up to alkaline cleaning operation.
2. No transfer of parts from one container to another up to plating operation.
3. Entire tumbling room shut down or made available for other work, reducing handling costs and eliminating power and sawdust costs.
4. More thorough cleaning, especially on recessed surfaces of articles into which sawdust packs and does not clean.
5. Brighter deposits and better coverage, especially on recessed areas.
6. Total saving estimated at approximately 100 per cent of cost of solvent for carrying out new process; that is, one dollar spent for material for carrying out the new process pro-

duces a reduction of one dollar in total costs.

Case III. Cleaning color-buffed brass shower heads before plating. Previous method: Soak in hydrocarbon solvent, punch out slugs of polishing compound from holes by hand, clean in hot alkaline solution, rinse, acid dip, nickel plate.

New method: Soak in solvent 15 minutes, rinse with good water pressure, clean in hot alkaline solution, acid dip, nickel plate.

Advantages:

1. Increased production and reduced cost per unit due to elimination of hand operations.

2. Elimination of rejects due to accidental scratching of color buffed surface by sharp tool.

Case IV. Cleaning sheet steel parts before cadmium plating. Previous method: Pre-clean in metal washing machine with alkaline solution before cleaning and electroplating on continuous automatic machine.

New method: Solvent applied and washed off by two metal washing machines in series. Parts placed on conveyor of automatic plating unit.

Advantages:

1. Complete cleaning of recessed areas resulting in complete coverage of such surfaces with cadmium, eliminating replating or touching up with aluminum paint to prevent rusting.

2. Brighter cadmium deposit due absence of dirt on metal surfaces.

3. Life of alkaline cleaning bath in plating series increased from 500 hours to 1300 hours.

4. Reduction in number of rejects due to improper cleaning.

The new process, as indicated above, introduces a number of advantages over the older processes which were not specifically designed to be dirt removing processes. Certain designs of parts, where proper venting and drainage of recessed areas have not been or cannot be provided for, will

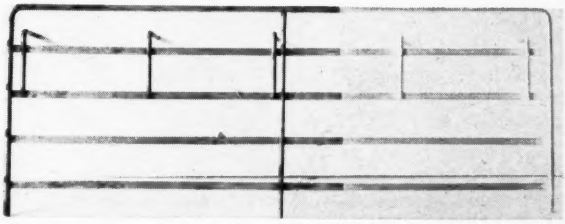


Fig. 6—Wire rack showing original appearance with one end cleaned and finished.

prevent the successful use of the process. There are also a few types of dirt, namely, dirt films deposited from or produced in water solutions, which are not removed by the process. The reason for this is that the metal surface and the dirt particles must both be oily in order to set up the condition of a water wet dirt particle and an oily metal surface which will be mutually repellant. Therefore films, such as freshly formed pickling smut on steel or the black copper smut on copper aluminum alloys etched in alkaline solutions, cannot be removed.

The process is not designed for the removal of adherent films such as oxide films which are corrosion products of the metal itself, and is not effective for the removal of such impurities.

The amount of surface which can be cleaned with one gallon of solvent naturally varies considerably. Small parts in bulk will, because of capillary effects and slower drainage, drag out a larger volume per thousand square feet than large plane surfaces. One gallon of solvent will treat two thousand square feet of plane sur-

faces, under correct operating conditions.

The following advantages have been noticed by users of the process. All of these advantages do not necessarily occur on every cleaning job, but one or more of them will be found on every job for which the process is suitable.

1. Elimination of hand wiping or tumbling operations previously required to remove dirt, finger prints, etc.

2. Elimination of irregularities in the electroplate or other finish where wiping or tumbling is impractical.

3. Brighter color of electroplated deposits or paint and lacquer finishes.

4. Complete coverage by electrodeposited or hot dipped metal coatings, especially in recessed areas.

5. Improved corrosion resistance of finished surfaces.

6. Increased speed of cleaning.

7. Increased life of alkaline solutions used for final cleaning.

8. Increased production from same labor and floor space.

9. Elimination of use of solvents yielding inflammable or toxic vapors.

10. Elimination of cost of heating soaking solutions or degreasing solvents.

H-V W-M BURNISHING BARREL BULLETIN BB 103. A 4-page bulletin describing the Mercil Type Burnishing Barrel has been issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The features described are the movable working unit, the sheet steel, electric welded barrel, and cover lifting device. The specifications as to sizes are listed in tabular form. Copy free upon request.

PANGBORN ABRASIVE FOLDER. The Panborn Corporation, Hagerstown, Md., has just issued a 4-page folder entitled "Certified Steel Abrasives" in which the advantages of "Certified" Steel Abrasives are described in detail. Copy free upon request.

PACKER AUTOMATIC POLISHING AND BUFFING MACHINES. The Packer Machine Co., Meriden, Conn., has just issued a 12-page booklet entitled "Increase Your Polishing and Buffing Production with Packer Automatic Polishing and Buffing Machines." Well printed and liberally illustrated with both photographs and diagrams showing the Packer machines in operation, this bulletin should be of especial interest to executives of plants in which polishing and buffing departments are located. Copy free upon request.

H-V W-M PLATING BARRELS MERCIL TYPE BULLETIN No. PB-105. The Hanson-Van Winkle-Munning Co., Matawan, N. J., has issued a 16-page booklet in which the Mercil Type Plating Barrel is illustrated and described. The method of increasing production with the Mercil Type Plating Barrel is explained together with the advantages of a motor driven plating barrel. The material used in these barrels, the style of hanging, and the minimum cost of operation are explained in detailed form. Included in the bulletin is a standard equipment chart which gives such information as the floor space required, type of motor, type of drive, and so on. Copy free upon request.

GAST SPRAY OUTFIT FOLDER. The Gast Mfg. Corporation, Bridgman, Michigan, has prepared a folder, "Built For The Professional", which describes the Zephyr and Air Champ spray outfits. The folder gives a well illustrated description of the outfits in applying various finishes to articles such as automobile bodies, refrigerators, wire screens, metal fences, radiators, and a variety of small parts. The many advantages of these spray outfits are fully explained. Copy free upon request.

BROWN THERMOMETER AND PRESSURE GAGE CATALOG No. 6703. This catalog, which is now being issued by The Brown Instrument Company, Wayne & Roberts Aves., Philadelphia, Pa., covers the complete line of Brown Thermometers and Pressure Gages—indicating, recording and controlling—and enumerates the wide range of industries to which they are applicable. It describes the classes of Brown Thermometers and Pressure Gages, explains their outstanding constructional features in simple, non-technical language, and presents a detailed description of each instrument of the line. Copy free upon request.

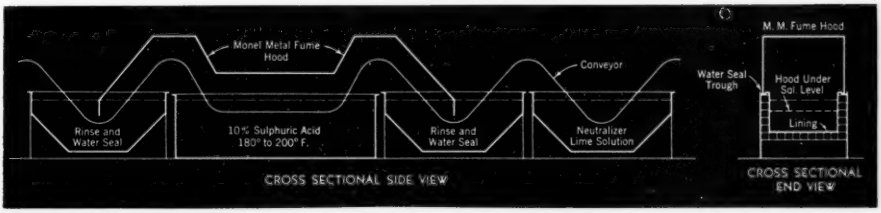
Ford Fights the Fumes of Fifty Tons of Acid

The disposal of fumes from acids used in the pickling or cleaning of metal parts, and their subsequent finishing, often is a complex problem in small as well as large industrial plants. Ford engineers have attacked the problem with characteristic thoroughness and persistence. The solution, as revealed by this brief glimpse of operations at River Rouge, indicates the importance of both design and materials in equipment used for handling corrosive liquids and fumes.

AMONG the many incidental problems involved by the vast scale operations at the 1100 acre plant of the Ford Motor Company at River Rouge, Michigan, few have been of more importance than that of disposing of acid fumes from pickling, cleansing and plating vats. The magnitude of the problem is indicated by the fact that more than 50 tons of acid are used daily during periods of peak production. The figure does not fall much below this point at any time while the plant is operating.

Acids, temperatures, and concentrations cover a wide range, as might be expected from the diversified operations involved. For most pickling purposes sulphuric acid is used, though muriatic and others are employed as well. Many plating operations are performed on automobile parts at the plant and a large department is maintained for the chrome plating of tools, also involving the use of acids.

Most pickling is done at temperatures between 160° and 180° F., with relatively little being carried out at room temperatures. The period of acid immersion and wash ranges between 35 and 45 minutes in most operations. Solutions run, on the whole, between 6 and 9 per cent in concen-



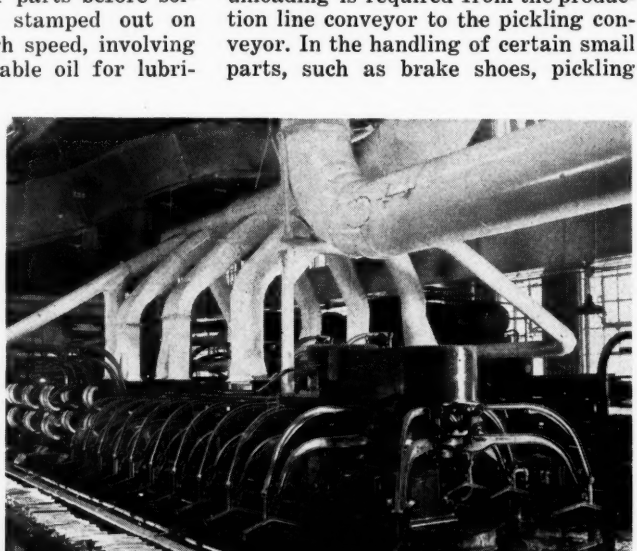
Construction details of large pickling tanks at the Ford Motor Company Plant showing the sequence of rinsing and acid tanks as well as the details of the water sealed Monel Metal hoods.

This ptotograph shows how the Monel Metal hood is sealed in water. Its end runs down into the water of the rinse tank. Sides are buried in the water channel shown in the foreground.

trations, with some notable exceptions. Chief among these is the pickling of small brass radiator parts before soldering. These are stamped out on huge presses at high speed, involving the use of considerable oil for lubricating, which must be removed before the parts are sent to the soldering tables. A short dip in acid of much higher strength is required for this purpose.

In the chrome plating of tools the temperature of the preliminary pickling runs about 135° F., a concentration of 50 per cent muriatic acid being used.

With the exception of the operations in the tool department, all pickling is handled in sequence in the regular line of production with the aid of mechanical conveyors. For the most part, however, loading and unloading is required from the production line conveyor to the pickling conveyor. In the handling of certain small parts, such as brake shoes, pickling

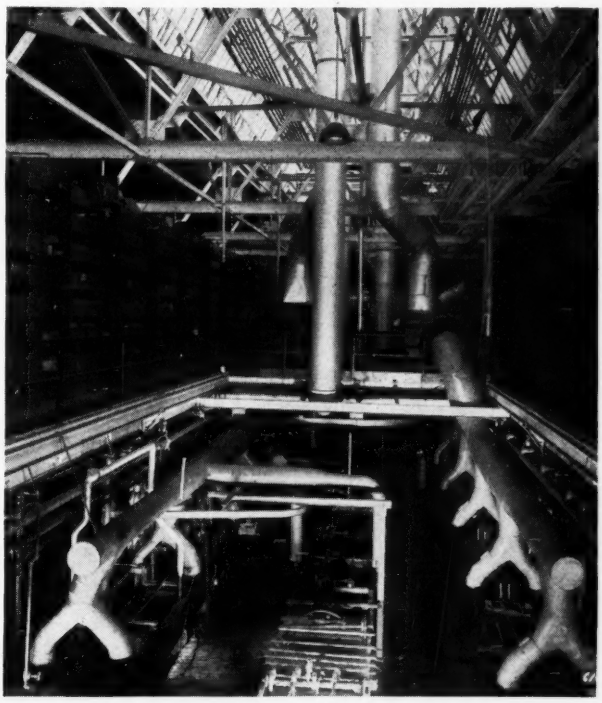


Pickling and plating are both handled in this continuous unit operating on brake shoes. Cadmium plating for rust protection is applied after the cleaning. Hoods and ducts are of Monel Metal.

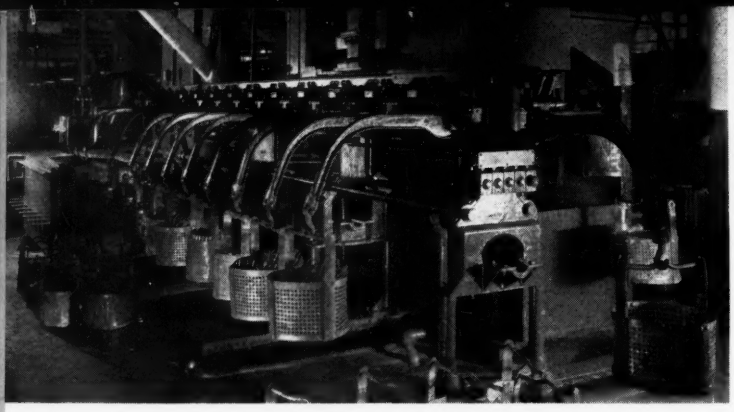
and cadmium plating—for rust protection—are carried out in the same piece of equipment, the parts passing through the regular acid cleaning and plating baths in one series of operations.

Obsolescence—like dirt—being one of the outstanding aversions of Henry Ford, new ideas and new equipment constantly are finding their way into pickling as well as all other processes in the progressive Ford plant. Naturally, therefore, equipment changes as opportunity and study point the way to possible improvements. Ford engineers steadily are at work on the development of special equipment to meet various plant needs. Therefore pickling operations, because of their importance, have received careful engineering attention and a novel type of apparatus has been devised. This consists of the conventional sequence of washing, acid, and rinsing tanks through which the parts to be pickled are carried by conveyor. The equipment departs from the conventional in that a water sealed hood is built over the acid bath to catch the fumes, most of which are condensed and returned to the bath. The balance is drawn out by power fans through ducts passing through the roof of the building. The drawing in Figure 1 shows the construction details of the water seal.

Another type of construction is found in the chrome plating department as well as elsewhere in the plant. Ducts are placed along the edges of the tanks through which the fumes are drawn off by a forced cross draft into exhaust pipes and carried out of the building. Like the water sealed tanks, this type of construction has been found thoroughly successful in protecting both workers and equipment. As additional precaution, all workers are required to wear masks when working around certain of the acids whose fumes are permanently destructive to tissues in the nose and throat.



With extensive duct systems such as this, replacement costs are high, running up above 600 man hours of labor at $1.00 per hour. Monel Metal ducts, some of which have been in use for 4 years, have been found an important factor in keeping these costs down.



Small parts are cleaned in continuous pickling units of this type, being run through sulphuric acid and rinsed in caustic soda. Hoods, ducts, and baskets are made of Monel Metal.

Obviously, since the destructive effects of the acid fumes are such as to make necessary the elaborate measures which have been taken to prevent the escape of the fumes, they involve a serious corrosion problem in the protective equipment.

Many different materials have been tried out by the Ford engineers, including galvanized iron, various corrosion resistant steels and Monel Metal.* The result has been the tendency on the part of those charged with plant maintenance to turn to Monel Metal. Generally it has been found that the life of Monel Metal ducts is about four times that of other materials.

All of the hoods over the water sealed tanks in the picklers are of this material. Some of them have been in service for four years and have not yet reached the limit of their useful life. Performance of all materials, of course, varies with the type of corrosive conditions encountered. In the plating department, for instance, some galvanized ducts have given a relatively satisfactory performance. Other galvanized ducts in the same department failed within a few months after installation.

Generally it has been the experience at the plant that where chromic acid fumes alone were involved the galvanized ducts have given their best service. Certain of the ducts, however, are exposed simultaneously to fumes from both chromic and muriatic acid. Where this combination of corrosive agents has been encountered Monel Metal alone has been found suitable. Some Monel Metal ducts in this service are still good for further use after more than a year of service.

Ford profits are made in the plants. They are built by the familiar mass production methods which have become synonymous with the Ford organiza-

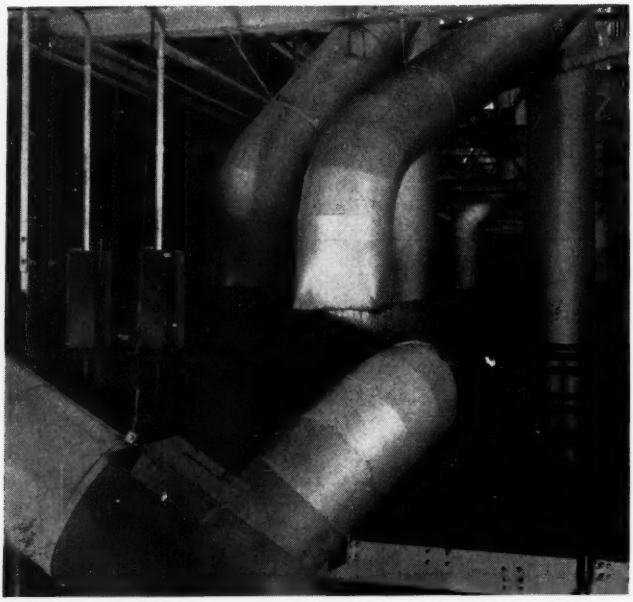
Hoods, ducts, and baskets of this continuous pickling unit are made of Monel Metal.

tion and the Ford name. Anything that contributes to speeding up production keeps red ink out of the profit side of the ledger. Conversely, what hinders or hampers production in any manner is apt to spell loss.

From section foremen up, they all know their costs as River Rouge and can translate repair and maintenance charges into terms of lost production as well as into those of dollars and cents, even when it comes to fume ducts. Many of the fume lines are over one hundred feet in length and from one foot to one and a half feet in inside diameter. To replace lines of this type would cost upwards from six hundred man hours at one dollar an hour, to say nothing of production delays. The first cost of material, therefore, becomes of secondary importance. Performance is what counts, since labor costs are no higher for longer lasting materials than for those with a shorter life.

As existing ducts of galvanized and other materials wear out, they are being replaced with those of Monel Metal. Practically all new construction is of this material. While no problems—not even corrosion problems—are ever regarded as permanently solved at a Ford plant, existing solutions serve until better ones can be developed. And as far as acid fume ducts are concerned Ford engineers—always on the lookout for something new or better—have found Monel

Most spectacular of all pickling operations at the Ford Plant are those where wire is cleaned. This unit, with its water, acid, and rinsing tanks, is 103 feet long and 34 feet wide. It has a capacity of 10,000 pounds of wire an hour, moving on mechanical conveyor at the rate of 1 foot in 2½ minutes.



The department where tools are chrome plated illustrates the extensive system of fume ducts in the Ford Plant. They are exposed to fumes from chromic and muriatic acids—a combination highly destructive to most metals. Monel Metal ducts in this department are still giving service after more than a year of use.

Metal to be the most practical and, in the long run, the most economical. That is why it has become a standard material in the Ford plant.

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THE A S M METALS HANDBOOK, 1936 edition, 1392 pages, published by the American Society for Metals. $10 to non-members, copies free to members.

This handbook, a revision and extension of the well known National Metals Handbook, appears in a new and pleasing dress, in a conventional 6x9-in. size. It is easy to read although the type size is small. Some 300 topics are listed.

The book is divided into two parts; a Ferrous Section of 883 pages, and a Non-Ferrous Section of 509 pages. Well over 100 pages of the ferrous section are devoted to information of a general nature, such as various methods of testing.

It is impractical to list all the subheadings. In addition to various tables of useful data, methods of hardness testing and other tests such as radiography and spectrographic analysis are included. As would be expected, considerable space is devoted to heat treating equipment and to the testing metallurgists' "tools" such as methods for photomicrography and grain size determination.

Naturally most of the important ferrous and non-ferrous alloy systems are listed and their characteristics discussed. A section is given over to the steel making methods, with discussions of melting and mechanical working.

One of the more important sections deals with specific heat treatments for various items such as dies, milling cutters, and the like, and another deals with the surface treatment of steel, including case-hardening, cyaniding, and nitriding.

In the non-ferrous section, it is noticed that the following metals and their alloys are included in the discussion; aluminum, cadmium, copper, lead, lithium, magnesium, nickel, platinum, tin.

The book was written by so many different authorities that it would not be surprising if some duplication of material occurred. It is to the credit of the editors that such duplication is not obvious. It is of interest to note that the authors and committees assembled their material as a "labor of love" rather than for pay.

This book will be useful to every user of metals. References are numerous and well selected, should it become necessary to look further into some subject. The A.S.M., which furnishes the book free to members, is to be commended on publishing this excellent reference work, which is a nice blend of practical and theoretical information.

Setting Up the Polishing Wheel

The information contained in this article has been drawn from many years of research and study.

POLISHING wheels should be coated in a room that is free from drafts. The room should be held at a temperature of approximately 80 deg. F. to prevent rapid jelling of the glue. The hot glue solution is applied to the face of the wheel with a brush and the wheel immediately rolled in a trough of abrasive grain until it has picked up all the grain that it will hold. The glue should be applied to the wheel and the whole setting-up operation carried out as quickly as possible to minimize jelling. A glue jelled during set-up is a poor adhesive for abrasive grain.

The downward pressure used to roll the glued wheel in the grain trough is a very important factor in determining the polishing action obtained. It is, therefore, important that uniform pressure be applied while rolling the wheel in the grain trough. For example, it has been shown that when a 200-pound man and a 130-pound man set up wheels and each uses his maximum strength, the wheel will give a different polishing performance.

Tests have shown that it is advisable to pre-heat the abrasive grain and cloth wheels to a temperature between 100 deg. and 120 deg. F. This will prevent the glue from jelling too rapidly during the set-up of the wheels. With pre-heating of the abrasive grain and wheels, the glue solution can generally be applied at a temperature of 140 deg. F.

On the other hand, when the abrasive grain and wheels are cold or only at normal room temperatures, the rapid jelling of the glue can be retarded by heating the glue to 160 deg. F. before using. This should be considered only a stop-gap, and not the best practice.

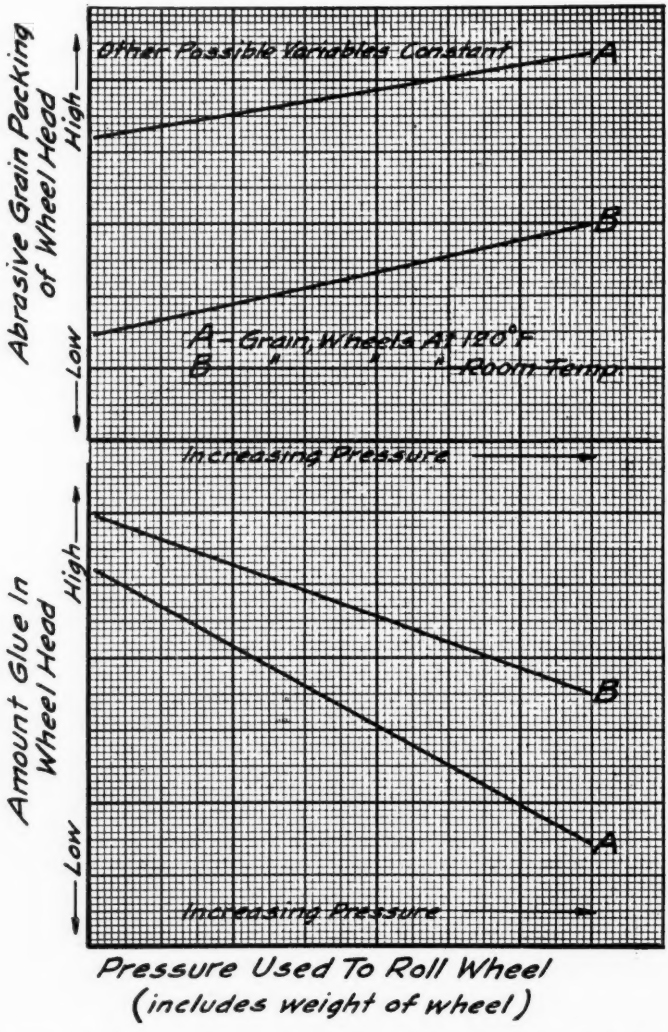
Cold wheels and grain will jell the glue rapidly, reducing its adhesive qualities as mentioned previously. There is the further effect that the abrasive grain will not penetrate as readily into the jelled glue film. Consequently the grain does not pack as well on the glue head, which means that the amount of glue relative to grain is excessive. The result is a wheel head which cuts too slowly and generates excess heat.

Other dry room conditions which are giving satisfactory results are a temperature of 75 deg. F. and 45 per cent relative humidity, and 90 deg. F. and 55 per cent relative humidity.

The actual time required to dry a polishing wheel under controlled conditions is, of course, dependent mainly on the density and thickness of the abrasive-glue head and to a lesser extent on the density of the cloth or leather or other material of the wheel itself. If a polishing wheel is over-dried it become brittle and will have a short life because the abrasive grains will tear out of the glue sockets before they have done their maximum work. When a wheel is under-dried, the glue does not develop its greatest possible strength. Such a wheel will

cut slowly, glaze rapidly, over-heat, and sometimes pieces will scale off.

Many polishing operations are performed on endless canvas or leather



A study of the chart shows: (1) Effect of downward pressure while rolling the wheel. The packing of the abrasive grain on the wheel head is closer with an increase in the downward rolling pressure while the per cent of glue decreases. (2) Effect of temperature of grain and wheels. The lines marked A denote abrasive and glue packing for wheel heads set up with 120 deg. F. preheated wheels and grain. Those marked B denote a set-up of wheels and grain at room temperature of about 70 deg. F. Note that set-up A for the same pressure has a higher ratio of abrasive to glue than set-up B. The temperature of the glue solution when applied was held at 140 deg. F.

belts set up with Alundum and glue. When necessary, the belts are recoated, usually by one of the following methods:

1. A suitable paste is made by adding pre-heated abrasive grain to the glue solution. For most polishing jobs the paste should contain the maximum amount of abrasive, which will leave a workable consistency when spread on the belts with a trowel, knife, or brush.

2. Another method is to paint the belt with glue and sprinkle the abrasive on this surface. This method is satisfactory for many operations where the finer sizes of abrasive grain are employed. On severe polishing jobs with coarse abrasive grain, it is necessary to press the grain more firmly into the glue by using a roller or similar device. Belts set up in sizes 60 and coarser are often given a size coat, using a solution of eight parts water and one part glue.

Coated belts should be dried under the same conditions outlined for polishing wheels.

Animal hide glue has the property of taking on or giving off moisture, depending upon the prevailing weather or the relative humidity in the drying room. Since hide glue reaches its maximum strength when it contains 10 per cent to 12 per cent moisture, the wheels should, therefore, be dried until the glue has this moisture content. This means that the dry room should be regulated not only for temperature but also as far as possible for relative humidity. Ideal drying conditions are 85 per cent F. and 50 per cent relative humidity. If these conditions are maintained with reasonable accuracy, most one-coat polishing wheels can be dried within 24 hours and two-coat wheels within 48 hours.

Drying time is dependent upon the thickness of the wheel head; the thicker the head the longer the drying time required. The strength of the glue, the size of the abrasive grain, and the number of coats determine the thickness of the head. For instance, a wheel set up with coarse grain requires a heavier glue solution than one set up with fine grain. For the same number of coats the head is thicker with the coarser grain, requiring a longer drying time.

A practical test to find out when a

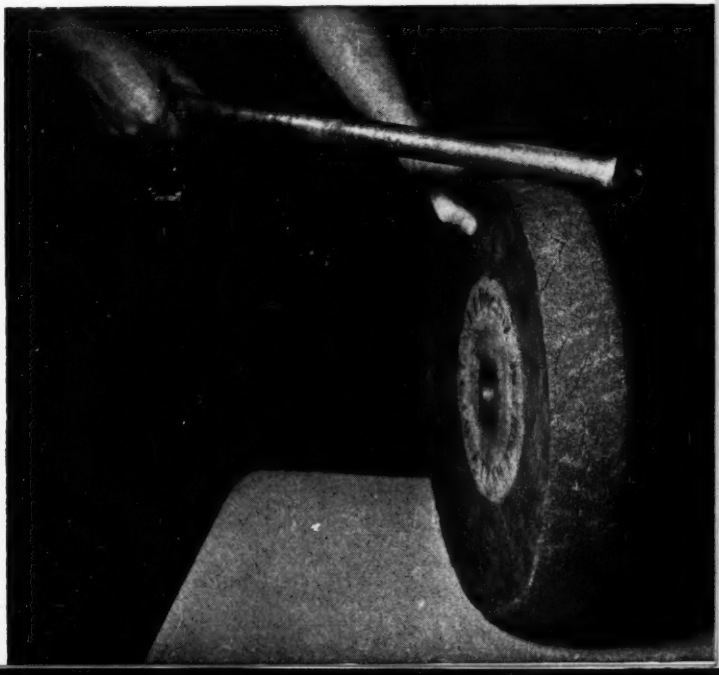


Illustration showing the correct method of cracking the wheel head

wheel head is dry enough is to hit it with a round steel bar and observe the readiness with which it cracks.

A study of the chart shows: (1) Effect of downward pressure while rolling the wheel. The packing of the abrasive grain on the wheel head is closer with an increase in the downward rolling pressure while the per cent of glue decreases. (2) Effect of temperature of grain and wheels. The lines marked A denote abrasive and glue packing for wheel heads set up with 120 deg. F. preheated wheels and grain. Those marked B denote a set-up of wheels and grain at room temperature of about 70 deg. F. Note that set-up A for the same pressure has a higher ratio of abrasive to glue than set-up B. The temperature of the glue solution when applied was held at 140 deg. F.

(From "Facts About Metal Polishing" published by Norton Company, Worcester, Mass.)

ELECTROPLATER'S MICROSCOPE BULLETIN EM-101. An Electroplater's Microscope Bulletin EM-101, in which the Bausch & Lomb Optical Company's microscope is described, has been issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The advantages of rapidly and accurately measuring plate thicknesses are described in detail. The mechanical features such as design and construction are also described. A copy of this bulletin can be had upon request.

Have you filled in the information on the yellow card? If not, please do so now and mail it to PRODUCTS FINISHING.

The Editor's Page

IT is customary to measure the progress of civilization by those features of the current period which seem to indicate, more than anything else, the difference between it and the periods preceding. Often the term used to designate the current era clings long after the characteristics from which it sprang have passed. The two most recent stages in the evolution of society were labeled the "Victorian Era" or "horse-and-buggy" age, and the so-called "machine age." The machine age is still with us, but the advantages of mechanical efficiency are being dimmed by a newly-awakened enthusiasm for design.

The trend during the past thirty years has steadily been toward the development of power-operated units for lightening labor, or for eliminating drudgery altogether, or for making living easier. However, it is fast becoming evident that the factor of utility is fast being subordinated to that of style and beauty. Design is becoming the important factor in our transportation units, our business equipment, our home and office furnishings, the machinery with which all these other things are manufactured, and even our childrens' toys. And the design is pointed generally in the direction of horizontal and vertical lines which seem to combine extreme simplicity with the speed which this generation demands. A marriage, so to speak, of beauty and efficiency. The particular era in which we are living will undoubtedly go down in history as the "streamline" age.

Streamlining has been the dominant note at all the recent expositions—North, South, and West. Store-fronts everywhere are streamlined. Cocktail bars are streamlined. Whether we think it is beautiful or not, it is here. Streamline designs are in evidence on every hand following each other like geese—but these are geese that lay golden eggs for metal finishers.

Streamlines call for color and for bright metal surfaces that emphasize the simplicity and symmetry of the lines. The first is ineffective without the second, and in that fact is an idea which many of the readers of this page can turn to account. Design is becoming so important in merchandising that expert designers are being employed in the development of products of all kinds. A designer is brought half way across the country to design a gas range for a stove manufacturer. Another designs a cabinet for a radio manufacturer. Another designs a store front for a clothing dealer. . These designers are artists, not manufacturers; thus art is finding a thousand outlets in our everyday life. And modern art is the best ally of the owner of a plating or lacquering or painting plant.

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UNCLE SAM'S RECEIPTS

"The Unalterable Proof of a Magazine's Circulation"

AS evidenced by the figures presented below, the total distribution of the November issue of PRODUCTS FINISHING was 12,568 copies. These figures are substantiated by The United States Post Office receipts, reproduced in facsimile at the left, showing a total of 12,240 copies placed in the mail... In addition 328 copies were sent out with stamps affixed.

November, 1936, Issue of Products Finishing

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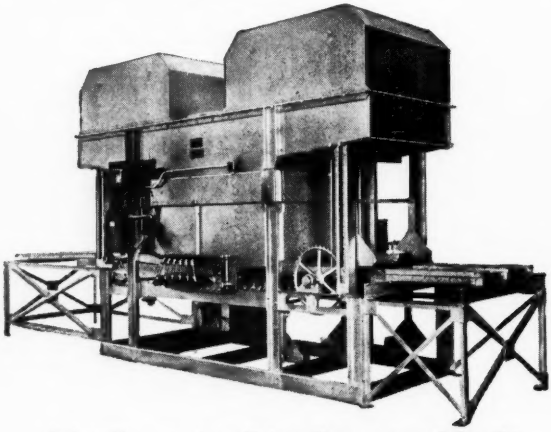
Additional information concerning advertising in this publication will be sent upon request.

PRODUCTS FINISHING
704 RACE ST., CINCINNATI, OHIO

New Plant Equipment and Materials

Automatic, Vapor-Type Detrex Degreaser

The automatic, conveyorized, vapor-type of Detrex Degreaser illustrated has been designed and built by the Detroit Rex Products Company, 13005 Hillview Ave., Detroit, Mich., for the cleaning of heavy gauge metal parts.



Automatic vapor-type Detrex Degreaser used for the production cleaning of heavy gauge metal parts.

The machine is equipped with a two-strand, cross-rod type of conveyor, which has a variable speed drive. There are 17 special fixtures suspended from this conveyor on 30-in. chain centers to handle the work baskets through the degreaser. Roller-type gravity conveyors at each end of the machine provides automatic loading and unloading. Electric immersion heaters and thermostatically controlled magnetic relay and line switch are used. The machine is also equipped with a full automatic vapor level control device.

This model of degreaser is built in various sizes to accommodate production requirements. The particular machine shown is 20 ft. long, 6 ft. 3 in. wide by 9 ft. 8 in. high. It has a rated production capacity of over 6,000 lbs. of heavy gauge metal parts per hour at a conveyor speed of 1 ft. per minute.

Parts are received on the gravity roller conveyor loaded in grill-type metal baskets having perforated plate separators. These work baskets are automatically lifted from the conveyor fixtures and carried through the machine. While in the machine, the parts are subjected to vapor cleaning in pure solvent vaporJeither Perm-A-Clor or Triad Safety Solvents being used. The baskets of work on being conveyed out the opposite end of the machine are automatically transferred onto the gravity rolls at the exit end. From here they are conveyed to the following heat treating or finishing operations (depending upon the requirements of the work).

The complete cycle of vapor cleaning requires only about 4½ min. The work is removed from the machine perfectly free of oil and dry.

Hydro-Degreaser

A tank to be known as the "Hydro-Degreaser" for use in connection with "Gunk" solvent compound has been developed by the Curran Corporation, Malden, Mass. Although this tank was developed in connection with the removal of heavy accumulations of oil and grease from airplane engines and parts, it has also been found particularly useful for economical operations in large industrial plants. It is said to have no toxic vapors and requires no heat or steam for its use. The Gunk solvent compound used as the cleaning medium in the Hydro-Degreaser is said to have a powerful affinity for waxes and buffing compounds, and will remove the last

trace of them without injury to the base metal.

Oil-coated and greasy metal parts may be effectively degreased by cold immersion in a Gunk solution contained in one compartment of the Hydro-Degreaser. are sluiced off with water which quickly emulsifies the treated grease and leaves a perfectly clean dry surface. If necessary, air can be used to agitate the solvent bath. An air line is provided for this purpose. The agitation reduces the time necessary for emulsion to a very short time.

The rinse section of the tank can be connected directly to a drain to carry off the dissolved oils and grease in emulsion form. The tank is self-cleaning and the process continuous.

It is stated that the solution is successful in cleaning aluminum castings, soft metals, and dissolving buffing compounds and waxes. Free plans for the construction of the Hydro-Degreaser cold immersion cleaning tank can be obtained upon request.

Walker-Turner Series 900 Belt and Disc Surfacer

The Walker-Turner Co., Inc., 7106 Berckman Street, Plainsfield, N. J., has brought out a metal surfacer to be classified as the "series 900." "Stroke" sanding, which enables the operator to surface large areas up to 36 in. in width. of any length, is handled very effectively. In "stroke" surfacing, the work is placed on a table which may be rolled cross-wise of the abrasive belt. The table and work are moved under the horizontal belt and pressure is applied to the inner surface of the belt by means of a

Walker-Turner Series 900 Belt and Disc Surfacer in Horizontal Position

Increased hourly production plus decreased hourly costs means more profit in your Finishing Room.

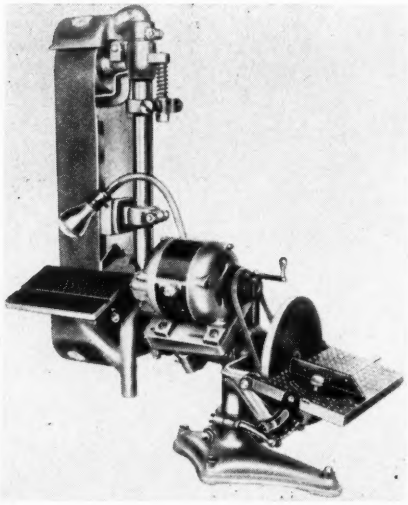
PACKER

Automatic Polishing and Buffing Machines are showing positive results in many types of industries. Production Proposal gladly given. Send for "Production Increase Book".

THE PACKER MACHINE CO., Meriden, Conn.

"stroking" block.

For the type of work ordinarily done on the belt sander, there is a table or platen beneath the upper section of the



Walker-Turner Series 900 Belt and Disc Surfacer in Vertical Position

belt. At this point small pieces can be sanded by merely holding them in contact with the moving belt. The whole belt unit can be shifted from a horizontal to a vertical position in one movement.

The disc sander may be used to cut mitered pieces rapidly or slowly depending on the grit, speed, and amount of pressure used.

Integral with the surfacer is a complete dust collecting system which removes the dust at both pulleys and from the sanding disc housing. Pulley hoods have individual dampers for controlling the suction.

The Jetal Process

A process which is said to give a lustrous black finish to iron and steel products to be known as the Jetal Process has been developed by the Alrose Chemical Co., 80 Clifford St., Providence, R. I. Articles to be Jetalized are dipped in a bath prepared by dissolving Jetal salts in water at room temperature. The bath can be heated by steam, gas, or oil; the temperature required is approximately 140 deg. C. or 284 deg. F.

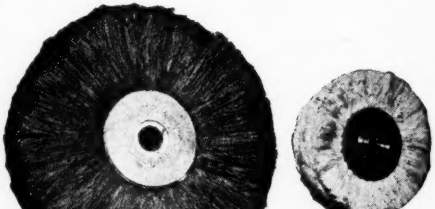
To control the Jetal bath, it is only necessary to add water to make up for loss by evaporation and to maintain the optimum specific gravity of the solution. None of the factors such as gravity or temperature are critical; a wide range of variation is permissible.

Work to be colored can be handled on racks, in bulk, in baskets, or barrels depending on its nature. Preliminary cleansing does not have to be as thorough as for plating although oil or rust must be removed by ordinary cleansing methods such as alkalines and pickling baths.

The Jetal Process can be applied to work having the highest degree of polished surface without dulling the lustre. This type of finish does not alter the dimensions of the article. It is said that it will not chip, scale, peel or discolor. Strips of steel can be passed through several reducing operations without affecting the finish. It can be stamped and shaped after the finish is applied without impairing the surface. Since it is firmly adherent to the metal and not a loose powder deposit, it forms an excellent bond for subsequent coating such as lacquer, varnish, enamel, paint or similar finishes. This finish is said to give excellent protection against rust on articles intended for both indoor and outdoor use.

Lea String Brush

The Lea Manufacturing Co., Waterbury, Conn., has developed a type of brush to be known as "Lea String Brush" for use in conjunction with the Lea method of metal finishing. In the past it has been necessary to use cloth



Lea String Brush

buffs for producing satin and Butler finishes by the Lea method. With the string brush, articles having contours and ornamentations can be more quickly

and economically finished. The brush is said to be more pliable than a cloth buff, and therefore permits the flexible surface when coated with Lea Compound to get into the various contours of many intricately shaped articles.

It is said to provide the resiliency and flexibility of a wire wheel and retain the compound as only a cloth medium can. It is a cool-working wheel for use principally in finishing and in cutting down. With the use of the Lea String Brush and Lea Compound, finishes can be produced ranging from a very dull satin to a bright Butler.

Marks Bond

A bonding process, developed to provide protection for metal parts against corrosion and the action of the elements, has been brought out by Bonding Process Corp., 10403 Northlawn Ave., Detroit, Mich. The product, known as "Marks Bond", is said to be fool-proof; that is, considerable latitude is permissible in the different variables. The surface produced is smoothly etched and forms an excellent base for paint or enamel for all products where an even, lustrous finish is required.

The Marks Bond process chemically produces on iron or steel a coating consisting of millions of microscopic crystals which are integral with the metal and have great adherence. Being insoluble in water, this coating effectively stops moisture from penetrating the paint film and provides a grip for the paint that will prevent flicking or peeling. The finishing material flows into the interstices between the fine crystals and securely anchors it to the metal. The solution can be adjusted to temperature or to the time requirements of individual production lines. It is claimed that the Marks Bond process is capable of appreciable savings in processing time, fuel costs, and material costs and tankage space.

The Marks Bond chemical is a concentrated compound which, when dissolved in water of a certain temperature, forms a solution that reacts immediately on properly cleaned metals. The coating is soft and velvety—opaque and gray in color. Among other features claimed for this process is the practical disappearance of sludge in dip tanks. Ability to work with lower temperatures results in better working conditions for the operators.

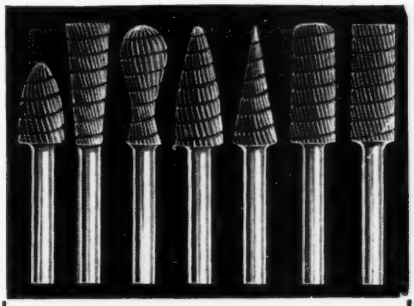
Metal is processed either by the dip or spray system methods without additional equipment being necessary. Only 15 to 30 seconds at a temperature of 160 deg. to 180 deg. is required in the spray system or dip tanks, depending on the speed of a production line. The articles to be bonded are usually cleaned chemically.

F-3105 Ful-Vue Goggle

The American Optical Company, Southbridge, Mass., has announced the addition of the F-3105 Ful-Vue Goggle

F-3105 Ful-Vue Goggle

to the line of eye protection equipment now made by this firm. According to the manufacturer, this equipment has all the comforts and safety features of the regular Ful-Vue Goggle plus side



McNEIL MILL CUT ROTARY FILES

. . . for cleaning cored holes and recesses preparatory to buffing and polishing.
. . . for burring of finished machine parts.
. . . for cleaning of excess beads and flash in machine welded parts.
Made in fine, medium, and coarse cuts.

Write for circular and prices.

McNEIL BROS. CO.
Box 33, College Hill, Cincinnati, Ohio

shields that provide extra protection against particles striking from any direction.

Both the metal frame and the wire mesh screens are non-corrosive. The mesh screens are easily cleaned and the mesh is sufficiently fine to prevent the passage of flying particles, but does not hinder air circulation.

Binks Connections For Spray Guns

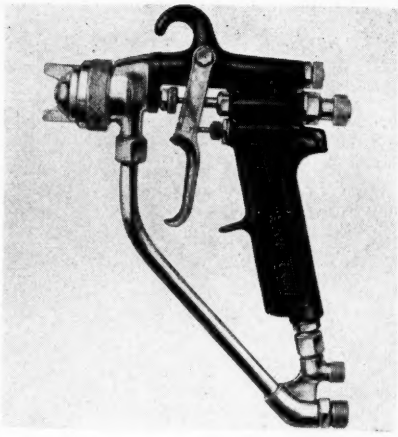
The Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill., announce two handy spray gun connections which make for closer control, better balance, and faster production in spraying operations. These connections are for Binks Thor Model 7, or Thor Model 2 Spray Guns.

For such spray operations where it is necessary to bring both air and material hose to the bottom and back of the gun, Binks T-785 air and material bottom connection will effectively solve the problem. A ⅜-in. female swivel nut and ⅜-in. male thread is integral with the material connection. A ¼-in. female swivel nut and a ¼-in. male thread is integral with the air connection. All pipe threads are standard, therefore, can be adapted to any size thread desired.

The Binks T-784 bottom material connection brings air and material connec-

Binks Model T-785

tions together at the bottom of the handle of the gun. This gives the operator closer control over spraying operations. A standard ⅜-in. female pipe



Binks Model T-784

thread swivel nut and ⅜-in. male thread can be adapted to any size thread desired.

Protex 2 A

The Park Sales Co., 3 Clark Place, New York, N. Y., has placed on the market a protective film liquid to be known as "Protex 2 A." This liquid film can be applied to any article to protect its surface from being scratched during the last stages of manufacturing, during packing and shipping, or while in dealers' stock or show rooms.

It comes in two colors, blue and red, and is transparent. It is easily applied with a soft brush and dries in but a few minutes. Protex 2 A can be used on metals such as silver, gold, platinum or chromium plated metals. According to the manufacturer one of the principal advantages of this protective film is that it can be removed without the use of a dissolvent. Only a damp cloth or blotting paper must be used in order to remove the film.

Protex 2 A is particularly recommended for the protection of watch cases, cigarette cases, ornaments, and any kind of silver and gold ware. It is especially recommended for use in the watch and jewelry industries.

SpecOrak Plating Racks

The Special Chemicals Corporation, 30 Irving Place, New York City, N. Y., has developed a special line of plating racks to be known as "SpecOrak." All of the

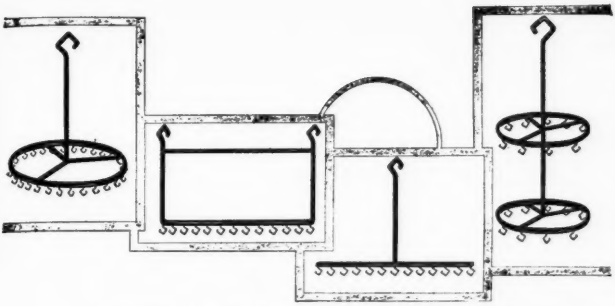


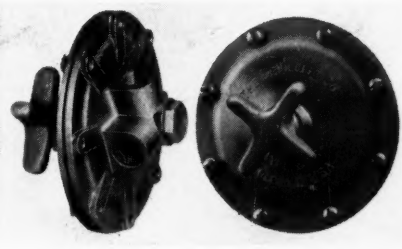
Illustration Showing SpecOrak Plating Racks

metal parts of these racks are completely covered with a thick coating of special insulation which is not affected by any plating solution, either acid or alkali. It is said that no metal can be deposited on the rack during the plating process, thus saving current and keeping refining losses down to a minimum. The line of SpecOrak is recommended for a variety of solutions including precious metals.

The SpecOrak plating racks are so constructed that the work when placed in the tank receives an equal distribution of current and plating, insuring a uniform finish.

DeVilbiss Type HFS Regulator

The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio, has brought out a low capacity regulator to be known as the Type HFS and designed for the sensitive regulation of air pressures below 30 lbs. The 4-in. diameter diaphragm of the regulator provides a sensitivity of effective area approximately six times as great as the ordinary diaphragm which is generally only 1½ in. in diameter.



DeVilbiss Type HFS Regulator

Regulated air pressure on the Type HFS Regulator can be graduated up to 30 lbs. with but one ounce variation for 10 lbs. variation of main line pressure. That is, a variance of 40 lbs. in main line pressure will cause only four ounces variation in the regulated air pressure. The diaphragm is clamped in the regulator body between two brass castings fastened together by radially spaced bolts. Special valve design and construction prevent the valve seat from cutting into the rubber valve. The Type HFS Regulator provides dependable, accurate equipment for service during the sensitive regulation of low air pressures.

ATC Automatic Reset Cam Timer Series 2500

The Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa., has added to their line of temperature control mechanisms the Automatic Reset Cam Timer Series 2500. The timer as shown in the illustration controls two load circuits. Reset timers of this type are available up to 10 load circuits.

This type of reset timer is said to be essentially a cam timer with one added feature, that of being able instantly to resume the starting position in the event of power failure or any other manually or automatically produced break in the clutch holding-in circuit. Circuits may be opened or closed at start and make or break after a fixed or an adjustable interval. The normal cycle is one-half

NEW SPRAY GUN

In the time it takes to adjust old fashioned paint spray equipment, you can write us for specifications and prices of the new Type MM Paint and Lacquer Spray Gun, which cuts both time and operating costs on every job and builds your profits. Bring your shop up-to-date with the new Type MM Spray Gun.

THE ALEXANDER MILBURN CO.
1436 W. Baltimore St., Baltimore, Md.

revolution of the camshaft and can be supplied in the range of from 30 seconds to 15 minutes duration. Unless and until reset, the camshaft stops at

ATC Automatic Reset Cam Timer Series 2500

the end of its cycle. After resetting, it may await a signal to restart or may restart at once.

Cams may be fixed or adjusted in their position on the shaft. Contacts may be either normally broken at the start or made at some fixed or adjustable point in the cycle or may be normally made or broken during the cycle, both makes and breaks being "slow." Corresponding breaks and makes occurring during the reset are "quick." Or all circuits may be blanked during the reset.

Cam construction makes for ready adjustability of their radial position on the shaft. The cam turns easily on a bushing fixed to the shaft. The bushing carries an arm with a pin near the cam periphery which fits into closely spaced pin holes. Movement from one pin hole to the next may represent steps of from one-half second to one minute, depending on shaft speed.

The timer is powered with a synchronous undirectional motor, rated 110 or 220 volts any standard frequency, and drives through a clutch which is functioned by a solenoid. The resetting action is instantaneous, requiring no remeshing of gears.

Enamel Stands Chrome Plating and Buffing

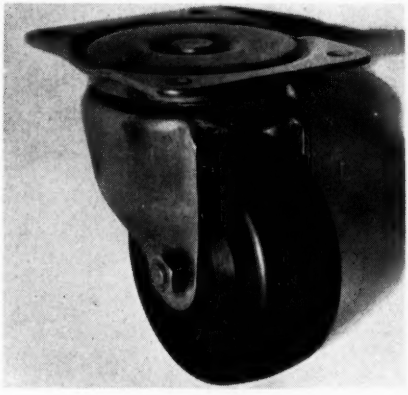
"Baflex Enamel" made by the Roxalin Flexible Lacquer Company, Elizabeth, N. J., is said by the manufacturers to be so tough that it actually stands a chrome plate bath, so hard that it can be buffed to a glass-smooth high lustre without drag.

This finishing product was developed especially for the metal novelty industry. On such products as brush-backs, etched name plates, compacts, vanity cases, cigarette cases, it can be applied directly on the base metal.

It air dries dust free in normal lacquer time, but to give Baflex its unusual durability, a bake of 275 deg. F. for one hour is required. Even when several coats are applied, only one bake of this enamel is necessary. Highlights can then be chrome plated and then buffed clean without drag. Baflex Enamel can be supplied in all colors, and can be applied by spraying.

Corrosion Resistant Specialties

Two products designed to meet corrosive problems in plants where acid, alkali and other corrosive agents are encountered have just been announced by The International Nickel Company, Inc., 67 Wall St., New York, N. Y. One of these is a Monel caster for trucks, hampers and wheeled conveyors of all kinds. Available in both the stationary and swivel roller type, it is adapted for use in chemical plants, processing plants, electroplating plants, and similar establishments where corrosive materials are liable to spill over the floor. The metal



INCO Monel Caster

parts of the caster are entirely of Monel, including bearings, shaft and spacers,

the wheels being of a special rubber composition.

The second piece of equipment is designed for use in similar plants and is a special adaptation of an earlier piece of equipment. This is the Whitehead graduated type Monel pail, now made available in standard sizes of 12, 14 and 16 quarts. Its development follows the general acceptance of the non-graduated type of Monel pail which has been on the market for several years.

The bottom and sides are of 0.037-in. Monel electrically seam welded. The chime which is also seam welded is 0.078-in. thick and is seam welded to project ½ in. below the bottom. Monel ears are spot welded to the sides. The handle is 5/16-in. Monel rod and the rim is rolled over a 3/16-in. wire. The

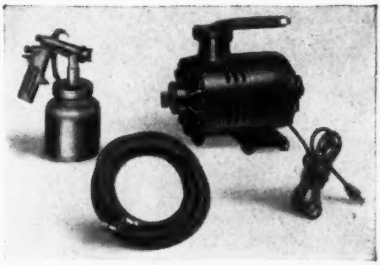
Whitehead Graduated Type Monel Pail

seam cannot break open and there are no rivets at which leaks can start.

Gast Spray Painting Machines

Two spray painting machines to be known as "Zephyr" and "Air Champ" have been announced by the Gast Manufacturing Corporation, Bridgman, Michigan. These machines are said to incorporate a rotary type compressor, and rotar blades which take up their own wear.

The manufacturer states that these machines will deliver a maximum of pressure and also a maximum volume of air per pound of weight. The "Zephyr" is equipped with a ¼ h.p., G. E. motor, rotary type ball bearing compressor, and



Gast Zephyr Spray Outfit

a type "R" gun with external-mix nozzle. It is said to be especially well adapted for use in factories, garages, etc.

The "Air Champ" is equipped with a ⅛ h.p., G. E. motor, rotary type compressor, and internal-mix gun nozzle.

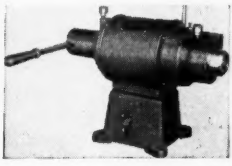
Duriron Heat Exchanger

The Duriron Co., Inc., Dayton, Ohio, has brought out a "Duriron Heat Exchanger" to be used in the heating of plating solutions.

The solution is pumped from the plating tank, through the filter and then through the heat exchanger, before returning to the plating tank. It can be applied in the heating of metal pickling solutions where objection is made to the use of live steam, and especially in enameling plants.

The Duriron Heat Exchanger is 12¾ in. in diameter and 66 in. in length. The heater capacity is approximately 450,000 Btu's per hour based on water. The recommended steam pressure is 75 lbs. per sq. in. The heater capacity of

IDEAL SPEED LATHES



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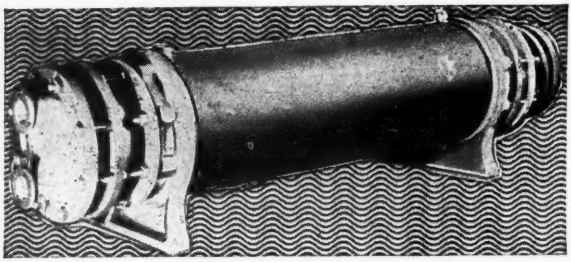


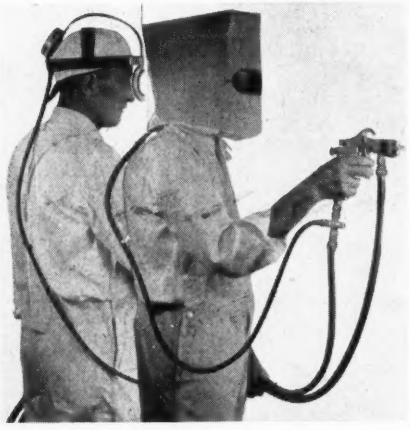
Duriron Heat Exchanger

450,000 Btu's is based on a throughput of 50 g. p. m. with 75 lbs. steam pressure with a temperature rise of 16 degrees to 55 degrees F. With lower steam pressure and correspondingly lower thermal head, the capacity and temperature rise will be somewhat lowered.

An acid inlet and outlet with a 2-in. flange connection is provided. The steam jacket is of welded steel construction supported by legs welded to the jacket.

DeVilbiss Type MPH Respirator

Announcement has been made by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio, of the development of a new Hood Respirator especially designed for use in those occupations where there is a fume or dust hazard. This respirator, the type MPH, covers the head and neck fully, and provides complete protection where ventilation is inadequate or against materials present in the air harmful to eyes, ears, or respiratory organs.



DeVilbiss Type MPH Respirator. (Right) With Hood in Position. (Left) Hood Removed to Show Filter and Air Outlet.

Air flows into the hood through an efficient filter, diffuses throughout, and, flowing out through the opening provided for vision, prevents outside atmosphere from approaching the eyes or entering the hood. Thus clear vision without glass or other transparent material to become fogged is provided with safety.

The unit consists of a light-weight headgear, air filter and air hose which is connected to the air line with a special DeVilbiss quick detachable connection, and a light-weight sanitary flame proofed hood which is supported by the headgear. This hood is fastened around the neck by a draw string. The hood can be removed and replaced by a new one when it becomes soiled.

The respirator is recommended for use in atmospheres containing offensive chemicals, nauseating vapors, particles of lint, paint spray, dirt, or dust. Offering adequate protection against such conditions, it permits maximum comfort and complete freedom of movement without binding or restricting the operator in any way.

Metallic Lacquers

A line of metallic lacquers has recently been announced by The Stanley Chemical Company, East Berlin, Conn.

These lacquers are offered in 26 standard shades and provide a wide range of colorful, smooth, lustrous finishes. All of these colors except five contain no dye or bleeding pigments thus insuring maximum resistance to fading. This permits top coating with a clear lacquer when desired. The formulation of these materials practically eliminates the settling of the metal powders. It is claimed that normal stirring before use will produce a uniform color and metallic effect.

These lacquers are designed for spray application to steel, brass, aluminum, and other metals. It is stated that manufacturers will find them extremely economical as they can be reduced considerably, and will produce a film of ex-

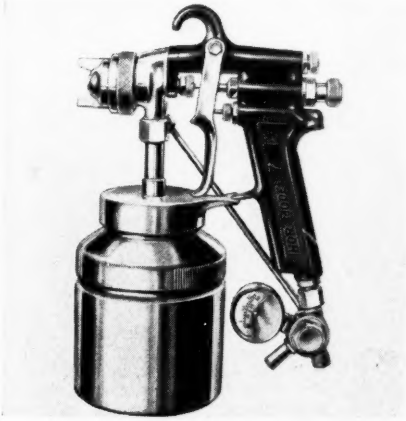
cellent adhesion, hardness, and durability.

Binks Pressure Cup Spray Gun

A pressure cup assembly with regulator and gauge which attaches directly to Binks standard Thor Model 7 or Thor Model 2 guns has been announced by the Binks Mfg. Co., Chicago, Illinois.

The assembly is recommended for all types of materials which are of such consistency that they cannot be sprayed successfully with a syphon feed cup. It can be used to duplicate pressure feed conditions in laboratory testing or for production painting requiring pressure conditions with small quantities of materials.

A specially cast cover fits snugly over the handle finger-rest assuring a firm fitting cup. Regulator and gauge are well away from the danger of clogging



Binks Pressure Cup Spray Gun

with paint even when the cup is tipped at right angles.

The unit is equipped with air adjusting valve, release and safety valve and air pressure regulator to control air pressure on cup. The quart capacity cup is easily attached to any standard Thor 7 or Thor 2 gun spray.

Aid to Dust Control

For use in determining the degree of danger of dusty operations, Bausch & Lomb have developed and are offering to industry through Willson Products, Inc.,

Willson Dust Counter with Supplies and Case

Reading, Pa., an instrument which simplifies in a remarkable manner the problem of dust control.

There is nothing to set up where the count is to be taken. The operator can enter the room, take a sample and leave in less than 15 seconds without interferring with routine or interrupting production. The instrument requires no skill to operate or technical supervision. Daily or hourly check of dust conditions can be made readily withous fuss or bother.

This new dust counter is said to combine in one unit the necessary air sampling device and a dark field microscope

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viewing and counting system. No accessory laboratory equipment is necessary. It is suitably cased for transporting, the complete outfit weighing but 12½ lbs.

Buffing or Polishing Compound Test Chart

To overcome the haphazard method of testing buffing and polishing compositions, the E. Reed Burns Mfg. Corp., 21-29 Jackson St., Brooklyn, N. Y., has

CHECK ACCURATELY
when
TESTING A SAMPLE
of
BUFFING OR POLISHING
COMPOUND

Operation ..... Material .....
Wheel Speed ..... Dia. .....

GRADE	PRESENT	E.R.B.
Price per lb.		
Weight of bar at start		
Weight of bar at finish		
Weight of Material used		
Cost of Material used		
Weight of Buffs at start		
Weight of Buffs at finish		
Weight of Buffs used		
Cost of Buffs used		
Time at Finish of Test		
Time at Start of Test		
Rate per hour		
Cost of Time taken		
Number of Units finished		
Cost Per Unit		

These are the factors that determine the "net" cost of a buffing or polishing composition.

It is not always possible to use the same grade on similar operations as the wheel speeds play an important part in the performance of a buffing compound.

When requesting sample always specify (1) metal, (2) diameter and speed of wheel.

Buffing or Polishing Compound Test Chart

worked out and is now issuing a "test-check" card. The five variables which enter into the cost of a buffing operation are as follows: weight of composition used, weight of buff used, time elapsed, hourly rate and unit finished.

These cards are printed in convenient form with two columns, one for the material being tested and the other for comparison with present stock. The use of these cards are said to afford a simple, permanent and accurate record of every sample of buffing and polishing composition. These cards will be furnished free of charge upon application to the company.

Easy-Flo Brazing Alloy

Handy & Harman, 82 Fulton St., New York, N. Y., has placed on the market a brazing alloy to be known as "Easy-Flo." Easy-Flo is said to be free flowing at 1175 deg. F., which is the maximum melting point yet developed for any brazing alloy or silver solder having a high degree of strength and ductility.

Easy-Flo is malleable and ductile and can be rolled into sheets or drawn into wire of practically every dimension. It is made in three standard sizes, 1/32-in., 1/16-in. and 3/32-in. round wire. These sizes have been found convenient for use on most work. It can be used to advantage in place of silver solder. Strong joints, as strong or stronger than the metal joined, have been made with Easy-Flo on both ferrous and non-ferrous metals including iron, steel, stainless steel and iron, Monel metal, Inconel, Everdur, copper, brass, bronze, nickel, copper-nickel alloys, chrome-nickel alloys, and silver. Joints are ductile and withstand shock and vibration.

Butt joints made with Easy-Flo have a tensile strength of 40,000 to 120,000 lbs. per square inch depending upon the metals joined. When the method of heating is such that the work is subjected to a low temperature for a brief period of time only, Easy-Flo with its fast-working qualities offers a special advantage in making joints on Monel metal, nickel or nickel alloys, and stainless steels. It flows freely, penetrates deeply and rapidly, and tends to avoid the detrimental effects that higher temperatures have on the physical qualities of these metals.

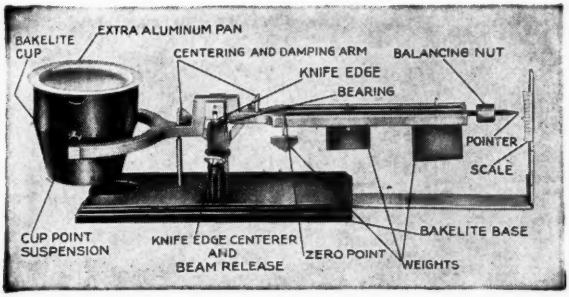
Under most conditions Easy-Flo shows marked corrosion resisting properties. Galvanic action set up by the metals joined is a more serious factor than the composition of the solder. Where severe corrosion conditions are encountered, for example, chloride corrosion on joints made on stainless steel, the use of a modification of the standard Easy-Flo known as Easy-Flo No. 3 is recommended. This alloy contains a small percentage of nickel and has a slightly higher melting point, that of 1270 deg. F.

In close fitting joints, very little Easy-Flo is required. A film is said to give far better results than a fillet, and, due

to the low melting point and less preheating, labor, time and gas are saved. Due to the penetration, there is little or none of the alloy left on the outside of the joint.

Bennett Balance

A precision scale for weighing small parts, powders, and liquids, to be known as "Bennett Balance", has been brought out by the Chemical Publishing Co., Inc., 148 Lafayette Street, New York, N. Y.



Bennett Balance

The Bennett Balance weighs up to 100 grams or about 4 ounces and it has a sensitivity of 1/100 of a gram or 1/7 of a grain. It is available in either the metric or the apothecary system of weights.

It is a rugged, compact device, less than a pound in weight and about 12 in. in length. Because of its small size and weight, it can be carried from place to place. The Bennett Balance has no loose weights.

Mazic Process

Zinc is claimed by some manufacturers to afford first-class protection against rust. The wide application of zinc plating has, however, been delayed by lack of a plating method which would produce a bright, rather than white, finish and which would be easy to maintain.

The "Mazic Process" of bright zinc plating which has been developed by the Hanson-Van Winkle-Munning Co. of Matawan, N. J., permits heavy deposits from a cyanide solution and is said to give satisfactory results in steel tank, semi-automatic and full automatic plating systems. The plate is truly bright and is said to compare favorably with the best cadmium finishes.

Solutions are easy to maintain and the high cathode current density permissable in the Mazic solution makes this a high speed plating bath. Only Mazic anodes, made from a special alloy, can be used in the Mazic solution and tanks should be of unlined steel.

Acid Proof Cement

"Sauer-Eisen Cement No. 31", made by the Sauereisen Cements Co., Sharpsburg, Pa., is a sodium silicate cement which is quick setting and self-hardening, due to the chemical reaction of the ingredients of the mortar. The cement is shipped in combination form of powder and liquid binder.

Sauer-Eisen Cement No. 31 hardens by setting (not drying), the initial set taking place within approximately one hour, while the final set occurs in 24 to 36 hours, when the tank can be used. It has a tensile strength of 265 lbs. per square inch. If 50 per cent Silica Sand is added, the tensile strength is increased to 400 lbs. per square inch.

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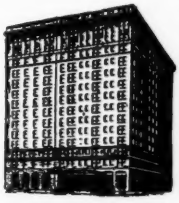

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